Let's Keep Moving!

2003 MAG Conformity Analysis

Special FY 2004-2007 Transportation Improvement Program & Regional Transportation Plan

November 2003

REGIONAL TRANSPORTATION PLAN
MARICOPA ASSOCIATION of GOVERNMENTS

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2003 MAG CONFORMITY ANALYSIS

FOR THE

SPECIAL FY 2004-2007
MAG TRANSPORTATION IMPROVEMENT PROGRAM

AND THE

MAG REGIONAL TRANSPORTATION PLAN

November 2003

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1 FEDERAL AND STATE REGULATORY REQUIREMENTS 1-1

Federal and State Conformity Rules 1-1
Conformity Rule Requirements 1-4
Air Quality Designations 1-7
Conformity Test Requirements 1-10
Analysis Years 1-13

2 LATEST PLANNING ASSUMPTIONS 2-1

Population and Employment 2-3
Traffic Counts 2-4
Vehicle Miles of Travel 2-5
Speeds 2-7
Vehicle Registrations 2-8
Implementation Measures 2-9

3 TRANSPORTATION MODELING 3-1

Transportation Models 3-1
Socioeconomic Projections 3-3
Traffic Estimates 3-4
Transit Networks And Operations 3-6

4 AIR QUALITY MODELING 4-1

Carbon Monoxide 4-2
Ozone 4-4
PM-10 4-6

5 TRANSPORTATION CONTROL MEASURES 5-1

Federal Conformity Rule Requirements for TCMs 5-1
Applicable Air Quality Implementation Plans 5-4
TCM Findings for the TIP and Regional Transportation Plan 5-6
Measure-by-Measure TCM Assessment 5-9

6 TIP AND RTP CONFORMITY 6-1

Conformity Test Results for Carbon Monoxide 6-2
Conformity Test Results for Ozone 6-3
Conformity Test Results for Particulate Matter 6-3

Glossary G-1
References R-1
Appendices, Volume 1 . . . . . (contained in separate document)
Appendices, Volume 2 . . . . . (contained in separate document)

TABLES

Table		Page
1-1	Conformity Criteria from the Final Rule	1-5
2-1	Latest Planning Assumptions for MAG Conformity Determinations	2-2
2-2	HPMS Reconciliation Factors	2-6
2-3	Ratio of Estimated/Observed Vehicle Hours of Travel* 1993 PM Peak Period	2-8
2-4	SIP Measures Assumed in the 2003 MAG Conformity Analysis	2-10
3-1	Traffic Network Comparison for Scenarios Evaluated for 2003 MAG Conformity Analysis	3-5
3-2	Transit Fares in Effect at the Time of Completion of the 2003 MAG Conformity Analysis	3-8
4-1	PM-10 Certified Street Sweepers Assumed in 2003 MAG Conformity Analysis	4-9
5-1	Programmed Transportation Projects That Implement TCMs and other Measures	5-8
6-1	Conformity Test Results for CO, VOC, and PM-10 (metric tons/day)	6-4

FIGURES

Figure		Page
ES-1	Carbon Monoxide Results for Conformity Budget Test	ES-5
ES-2	Volatile Organic Compounds (VOC) Results for Conformity Budget Test	ES-6
ES-3	PM-10 Results for Conformity Budget Test	ES-7
ES-4	Transportation Control Measure Funding in the Draft FY 2004-2007 MAG Transportation Improvement Program	ES-8
1-1	Air Quality Nonattainment Areas for the Maricopa County Area, Arizona	1-9
6-1	Carbon Monoxide Results for Conformity Budget Test	6-5
6-2	Volatile Organic Compounds (VOC) Results for Conformity Budget Test	6-6
6-3	PM-10 Results for Conformity Budget Test	6-7

EXECUTIVE SUMMARY

This report presents the 2003 MAG Conformity Analysis for the FY 2004-2007 MAG Transportation Improvement Program (TIP) and the MAG Regional Transportation Plan (RTP). The Maricopa Association of Governments (MAG) is the designated Metropolitan Planning Organization (MPO) in Maricopa County, Arizona, and is responsible for regional transportation and air quality planning. The analysis demonstrates that the criteria specified in the federal transportation conformity rule for a conformity determination are satisfied by the TIP and RTP. A finding of conformity for the FY 2004-2007 MAG Transportation Improvement Program and MAG Regional Transportation Plan is therefore supported.

Summarized below are the applicable federal criteria or requirements for conformity determinations, the conformity tests applied, the results of the conformity assessment of the TIP and RTP, and an overview of the organization of this report. Figures presenting the conformity test results are provided at the end of the Executive Summary.

CONFORMITY REQUIREMENTS

The federal transportation conformity rule (40 Code of Federal Regulations Parts 51 and 93) specifies criteria and procedures for conformity determinations for transportation plans, programs, and projects and their respective amendments. The federal transportation conformity rule was first promulgated in 1993 by the U.S. Environmental Protection Agency (EPA), following the passage of amendments to the federal Clean Air Act in 1990. The federal transportation conformity rule has been revised several times since its initial release to reflect both EPA rule changes and court opinions. The transportation conformity rule and court opinions are summarized in Chapter 1.

The conformity rule applies nationwide to “all nonattainment and maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan” (40 CFR 93.102). Currently, portions of Maricopa County are designated as nonattainment areas with respect to federal air quality standards for three criteria pollutants, carbon monoxide (CO), ozone, and particulate matter under ten microns in diameter (PM-10). Therefore, transportation plans and programs for the nonattainment areas for the Maricopa County area must satisfy the requirements of the federal transportation conformity rule.

Under the federal transportation conformity rule, the principal criteria for a determination of conformity for transportation plans and programs are:

(1) the TIP and RTP must pass an emissions budget test with a budget that has been found to be adequate by EPA for transportation conformity purposes, or an emissions reduction test;

(2) the latest planning assumptions and emission models specified for use in air quality implementation plans must be employed;

(3) the TIP and RTP must provide for the timely implementation of transportation control measures (TCMs) specified in the applicable air quality implementation plans; and,

(4) consultation.

Consultation generally occurs at the beginning of the conformity analysis process, on the proposed models, associated methods, and assumptions for the upcoming analysis and the projects to be assessed, and at the end of the process, on the draft conformity analysis report. The final determination of conformity for the TIP and RTP is the responsibility of the Federal Highway Administration and the Federal Transit Administration.

CONFORMITY TESTS

The conformity tests specified in the federal transportation conformity rule are: (1) the emissions budget test, and (2) the emissions reduction test. For the emissions budget test, predicted emissions for the TIP and RTP must be less than or equal to the motor vehicle emissions budget specified in the approved air quality implementation plan or the emissions budget found to be adequate for transportation conformity purposes. If there is no approved air quality plan for a pollutant for which the region is in nonattainment or no emission budget found to be adequate for transportation conformity purposes, the emissions reduction test applies. For the 2003 MAG Conformity Analysis, the emissions reduction test was not applied.

The carbon monoxide motor vehicle emission budgets submitted in the Carbon Monoxide Redesignation Request and Maintenance Plan and the PM-10 emission budget submitted in the Revised 1999 MAG Serious Area PM-10 Plan may be used for conformity. In the September 29, 2003 *Federal Register*, EPA found the motor vehicle emissions budgets contained in the Carbon Monoxide Maintenance Plan adequate for conformity purposes, effective October 14, 2003. The EPA also issued a notice of adequacy in the *Federal Register*, effective April 21, 2000, finding that the submitted PM-10 motor vehicle emissions budget contained in the Revised MAG 1999 Serious Area Particulate Plan for PM-10 was adequate for transportation conformity purposes (EPA, 2000a). In addition, EPA published the approval of the Revised MAG 1999 Serious Area Plan for PM-10 and budget on July 25, 2002.

Chapter 1 summarizes the applicable air quality implementation plans and conformity tests for carbon monoxide, ozone, and PM-10. For the 2003 MAG Conformity Analysis, the emissions budget test was applied for CO, since the CO emissions budget was found to

be adequate for transportation conformity purposes by EPA, effective October 14, 2003. For ozone, an emissions budget test was performed for volatile organic compounds (VOC), because an approved SIP budget for VOC is contained in the Revised 1998 15 Percent Rate of Progress Federal Implementation Plan for Ozone. For PM-10, the emissions budget test was applied using the approved budget from the Revised MAG 1999 Serious Area Plan for PM-10.

RESULTS OF THE CONFORMITY ANALYSIS

A regional emissions analysis was conducted for the years 2006, 2015, 2016, and 2026 for each pollutant. All analyses were conducted using the latest planning assumptions and emissions models. The major conclusions of the 2003 MAG Conformity Analysis are:

- For carbon monoxide, the total regional vehicle-related emissions associated with implementation of the TIP and Regional Transportation Plan for the analysis year 2006 is projected to be less than the adequate interim emissions budget, and the emissions associated with implementation of the TIP and Regional Transportation Plan for the analysis years 2015, 2016, and 2026 are projected to be less than the adequate maintenance budget for 2015 established in the Carbon Monoxide Redesignation Request and Maintenance Plan. The applicable conformity test for carbon monoxide is therefore satisfied. The results of the regional emissions analysis for carbon monoxide are presented in Figure ES-1.

- For volatile organic compounds, the total regional vehicle-related emissions associated with implementation of the TIP and Regional Transportation Plan for all years tested are projected to be less than the emissions budget specified in the applicable Revised 1998 15 Percent Rate of Progress Federal Implementation Plan for Ozone. The conformity test for ozone is therefore satisfied. The results of the regional emissions analysis for VOC are presented in Figure ES-2.

- For PM-10, the total regional vehicle-related emissions associated with implementation of the TIP and Regional Transportation Plan for all years tested are projected to be less than the emissions budget found to be adequate for transportation conformity purposes from the Revised MAG 1999 Serious Area Particulate Plan for PM-10. The conformity test for PM-10 is therefore satisfied. The results of the regional emissions analysis for PM-10 are presented in Figure ES-3.

- Implementation of the TIP and Regional Transportation Plan will support and not impede the implementation of the TCMs that have been adopted as part of applicable air quality implementation plans. The current status of TCM implementation is documented in Chapter 5 of this report. Figure ES-4 presents the total funding programmed in the TIP for transportation projects that implement or provide for the timely implementation of transportation control measures and other air quality measures.

- Consultation has been conducted in accordance with federal requirements.

REPORT ORGANIZATION

The report is organized into six chapters. Chapter 1 provides an overview of the applicable federal and state conformity rules and requirements, air quality implementation plans, and conformity test requirements. Chapter 2 contains a discussion of the latest planning assumptions. Chapter 3 includes a summary of the transportation model characteristics, key socioeconomic data, and other data related to the land use and transportation system forecasts, and Chapter 4 describes the air quality modeling used to estimate emission factors and mobile source emissions. Chapter 5 contains the documentation required under the federal transportation conformity rule for transportation control measures. The results of the conformity analysis for the TIP and Regional Transportation Plan are provided in Chapter 6.

Excerpts from the applicable air quality implementation plans, consultation documentation, and other related information are contained in two volumes of appendices. Appendix B includes copies of consultation correspondence. Appendix S includes a transcript of the November 21, 2003 public hearing conducted on the Draft FY 2004-2007 MAG Transportation Improvement Program, Draft MAG Regional Transportation Plan, and the Draft 2003 MAG Conformity Analysis. Comments received on the conformity analysis and responses made as part of the public involvement process are included in Appendix T.

Figure ES-1: Carbon Monoxide Results for Conformity Budget Test

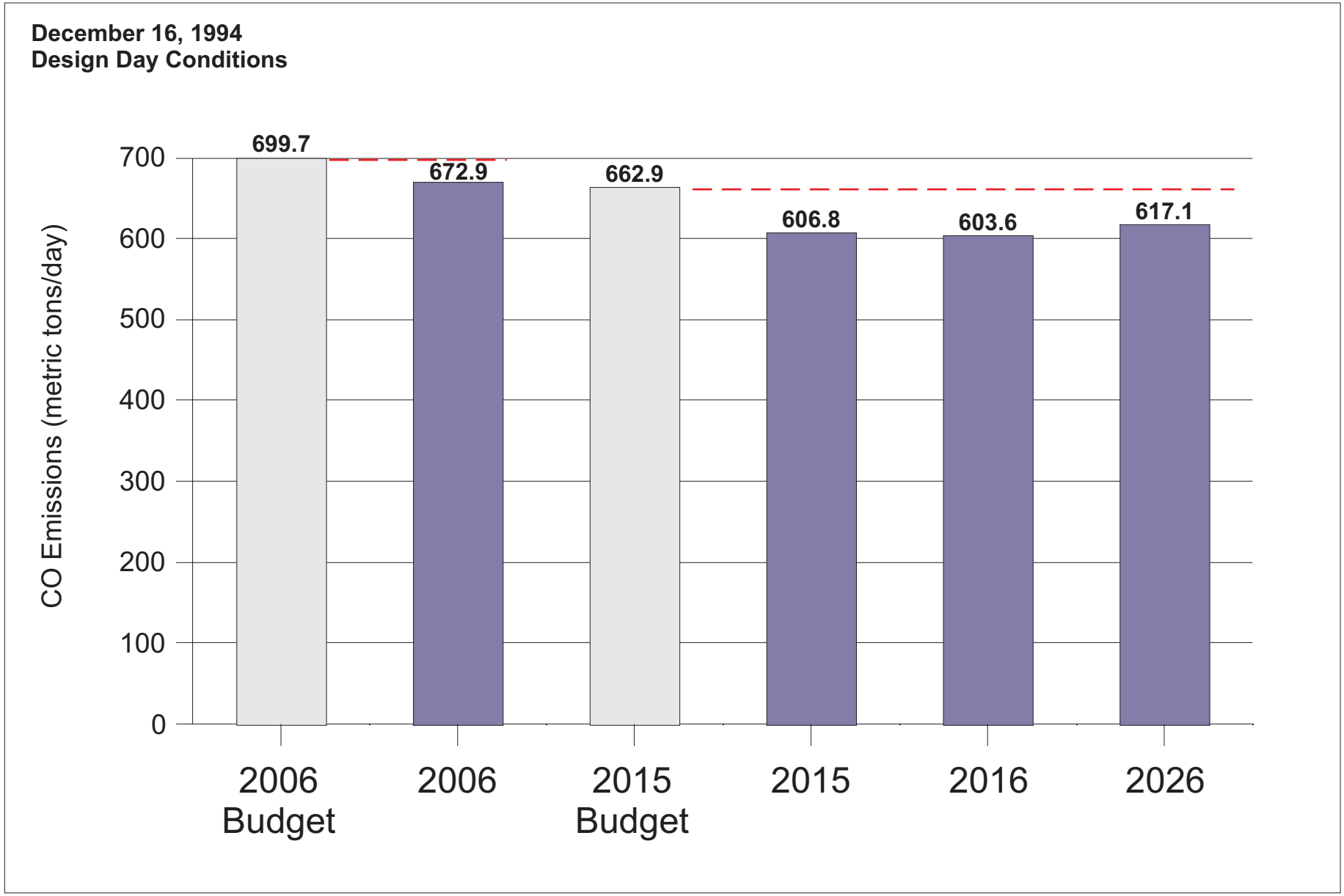


Figure ES-2: Volatile Organic Compounds (VOC) Results for Conformity Budget Test

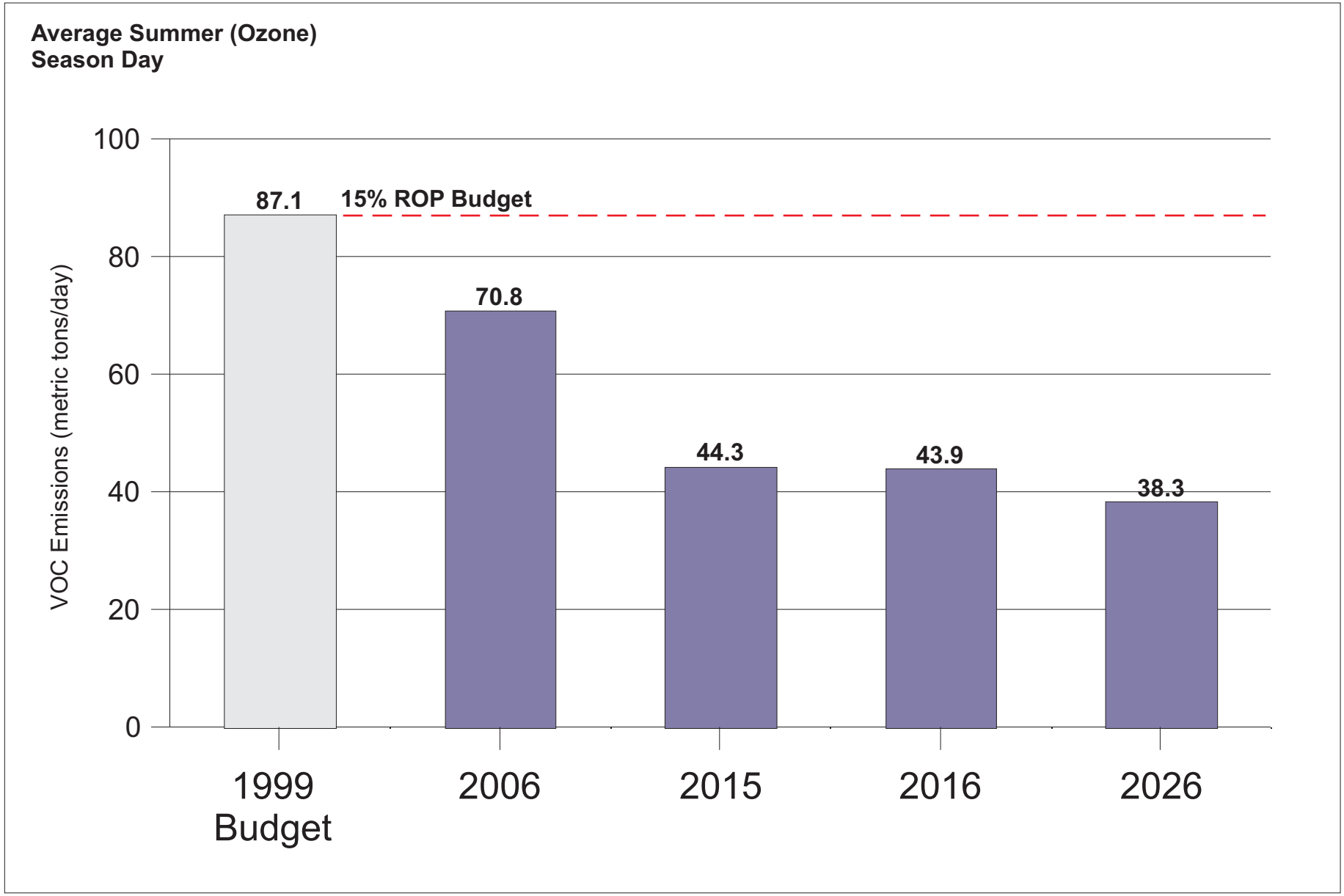


Figure ES-3: PM-10 Results for Conformity Budget Test

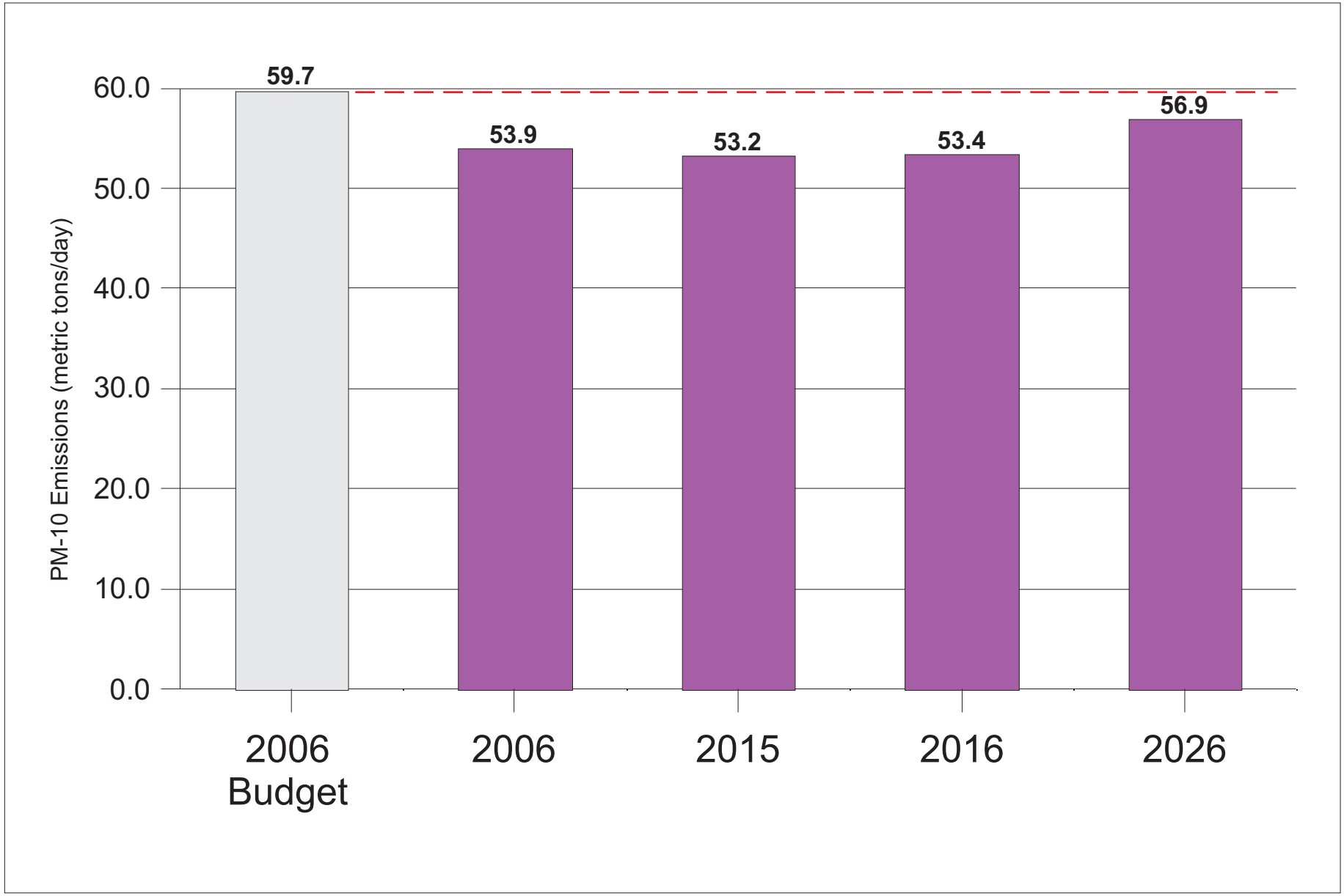
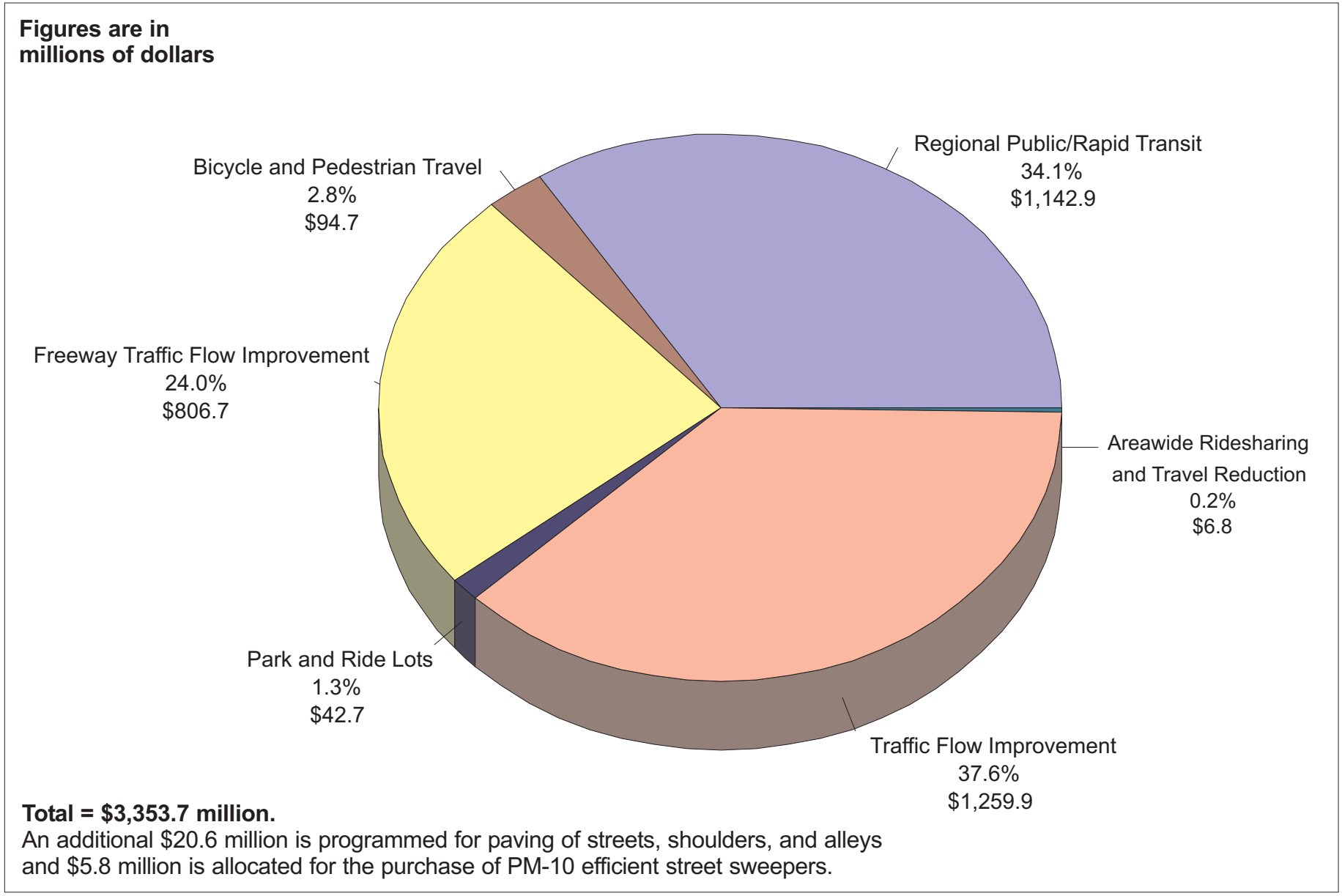


Figure ES-4: Transportation Control Measure Funding in the FY 2004-2007 MAG Transportation Improvement Program



Total = $3,353.7 million.
An additional $20.6 million is programmed for paving of streets, shoulders, and alleys and $5.8 million is allocated for the purchase of PM-10 efficient street sweepers.

1 FEDERAL AND STATE REGULATORY REQUIREMENTS

The criteria for determining conformity of transportation programs and plans under the federal transportation conformity rule (40 Code of Federal Regulations Parts 51 and 93) and the applicable conformity tests for the Maricopa County nonattainment areas are summarized in this chapter. The 2003 MAG Conformity Analysis for the FY 2004-2007 MAG Transportation Improvement Program (TIP) and the MAG Regional Transportation Plan (RTP) was prepared based on these criteria and tests. Presented first is a review of the development of the applicable conformity rule and guidance procedures, followed by summaries of conformity rule requirements, air quality designation status, conformity test requirements, and analysis years for the 2003 MAG Conformity Analysis.

The Maricopa Association of Governments is the designated Metropolitan Planning Organization (MPO) for the Maricopa County region in Arizona. As a result of this designation, MAG prepares the Transportation Improvement Program and Regional Transportation Plan, and the associated conformity analyses. The FY 2004-FY 2007 MAG Transportation Improvement Program serves as a detailed guide for preservation, expansion, and management of public transportation services. The Regional Transportation Plan covers the period FY 2004 through FY 2026 providing the blueprint for future transportation investments in the region. The RTP includes funding for freeways and highways, streets, regional bus and high capacity transit, as well as bicycle and pedestrian facilities, commensurate with available funding.

FEDERAL AND STATE CONFORMITY RULES

Clean Air Act Amendments

Section 176(c) of the Clean Air Act (CAA, 1990) requires that Federal agencies and Metropolitan Planning Organizations (MPOs) not approve any transportation plan, program, or project which does not conform with the approved State Implementation Plan (SIP). The 1990 amendments to the Clean Air Act expanded Section 176(c) to more explicitly define conformity to an implementation plan to mean:

> Conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and that such activities will not (i) cause or contribute to any new violation of any standard in any area; (ii) increase the frequency or severity of any existing violation of any

standard in any area; or (iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The expanded Section 176(c) also provided conditions for approval of transportation plans, programs, and projects; requirements that the Environmental Protection Agency (EPA) promulgate conformity determination criteria and procedures no later than November 15, 1991; and a requirement that States submit their conformity procedures to EPA by November 15, 1992. The initial November 15, 1991 deadline for conformity criteria and procedures was not met by EPA.

Federal Rule

Supplemental interim conformity guidance was issued on June 7, 1991 (EPA/DOT, 1991a and 1991b) for carbon monoxide, ozone, and particulate matter ten microns or less in diameter. The applicable period of this guidance was designated as Phase 1 of the interim period. EPA subsequently promulgated the Conformity Final Rule, in the November 24, 1993 *Federal Register* (EPA, 1993). The Rule became effective on December 27, 1993. The federal Transportation Conformity Final Rule has been revised several times since its initial release. The first set of amendments, finalized on August 7, 1995, (EPA, 1995b) aligned the dates of conformity lapses due to SIP failures with the application of Clean Air Act highway sanctions for certain ozone areas and all areas with disapproved SIPs with a protective finding.

The second set of amendments was finalized on November 14, 1995 (EPA, 1995c). This set allowed any transportation control measure (TCM) from an approved SIP to proceed during a conformity lapse, and aligned the date of conformity lapses with the date of application of Clean Air Act highway sanctions for any failure to submit or submissions of an incomplete control strategy SIP. The second set also corrected the nitrogen oxides provisions of the transportation conformity rule consistent with the Clean Air Act and previous commitments made by EPA. Finally, the amendments extended the grace period before which areas must determine conformity to a submitted control strategy SIP, and established a grace period before which transportation plan and program conformity must be determined in recently designated nonattainment areas. This grace period was later overturned in Sierra Club v. EPA in November 1997.

The third set of amendments was finalized August 15, 1997 (EPA, 1997a). These amendments streamlined the conformity process by eliminating the reliance on the classification system of “Phase II interim period,” “transitional period,” “control strategy period,” and “maintenance period” to determine whether the budget test and/or emission reduction tests apply. The amendments also changed the time periods during which the budget test and the “Build/No Build” test are required.

Other amendments to the transportation conformity rule have followed. To incorporate provisions from the Sierra Club v. EPA court decision, EPA promulgated an amendment to the transportation conformity rule on April 10, 2000 that eliminated a one-year grace

period for new nonattainment areas before conformity applies (EPA, 2000b). Then on August 6, 2002, the EPA promulgated an amendment to the transportation conformity rule which requires conformity to be determined within 18 months of the effective date of the EPA *Federal Register* notice on an budget adequacy finding in an initial SIP submission and established a one-year grace period before conformity is required in areas that are designated nonattainment for a given air quality standard for the first time (EPA, 2002b).

In addition, on June 30, 2003, EPA proposed to amend the transportation conformity rule to incorporate provisions from the March 2, 1999 Environmental Defense Fund v. EPA court decision (EPA, 2003a). This amendment revises the transportation conformity rule based on existing guidance issued by EPA and the United States Department of Transportation (USDOT) following the court decision. Other revisions to the conformity rule have been proposed to clarify the regulations. These revisions include: using submitted motor vehicle emissions budgets for conformity determinations only after EPA has found the budgets to be adequate; elimination of the 120-day grace period following a SIP revision disapproval without a protective finding; basing the latest planning assumptions available from the time the conformity analysis begins; and, requirements for budget tests performed for the attainment year and budget test requirements performed once a maintenance plan is submitted.

State Rule

State rules for transportation conformity were adopted on April 12, 1995, by the Arizona Department of Environmental Quality (ADEQ), in response to requirements in Section 176(c)(4)(C) of the Clean Air Act as amended in 1990 (ADEQ, 1995). These rules became effective upon their certification by the Arizona Attorney General on June 15, 1995 and, as required by the federal conformity rule, were submitted to EPA as a revision to the State transportation conformity SIP.

To date, a State transportation conformity SIP has not received approval by EPA. Section 51.390(b) of the federal conformity rule states: "Following EPA approval of the State conformity provisions (or a portion thereof) in a revision to the applicable implementation plan, conformity determinations would be governed by the approved (or approved portion of the) State criteria and procedures." The federal transportation conformity rule therefore still governs, as a transportation conformity SIP has not yet been approved for this area.

The State rule specifies that MPOs (i.e., MAG, for this region) must develop specific conformity guidance and consultation procedures and processes. MAG has developed and adopted two conformity guidance documents to meet State requirements. MAG developed the "Transportation Conformity Guidance and Procedures" document, which was adopted initially on September 27, 1995 by the MAG Regional Council. The document was revised by the MAG Regional Council on March 27, 1996 (MAG, 1996b). This guidance document addresses both the determination of "regional significance" status for individual transportation projects, and the process by which regionally significant projects may be approved.

MAG also developed the "Conformity Consultation Processes" document, which was adopted on February 28, 1996 by the MAG Regional Council (MAG, 1996a). This guidance document details the public and interagency consultation processes to be used in the development of regional transportation plans, programs, and projects within the Maricopa County nonattainment area.

Case Law

On November 14, 1997, the U.S. Court of Appeals for the District of Columbia issued an opinion in Sierra Club v. EPA involving the 1995 transportation conformity amendment that allowed new nonattainment areas a one-year grace period. Under this ruling, conformity applied as soon as an area was designated nonattainment. The EPA issued a final rule on April 10, 2000 in the *Federal Register* deleting 40 CFR 93.102(d) that allowed the grace period for new nonattainment areas (EPA, 2000b). Then, on October 27, 2000, the FY 2001 EPA Appropriations bill included an amendment to Section 176(c) of the Clean Air Act that adds the one-year grace period to the statutory language.

On March 2, 1999, the U.S. Court of Appeals for the District of Columbia issued an opinion in Environmental Defense Fund v. EPA involving the 1997 transportation conformity amendments. In general, the court struck down 40 CFR 93.120(a)(2) which permitted a 120-day grace period after disapproval of a SIP; determined that the EPA must approve a "safety margin" prior to its use for conformity in 40 CFR 93.124(b); concluded that a submitted SIP budget must be found by EPA to be adequate, based on criteria found in 40 CFR 93.118(e)(4) before it can be used in a conformity determination; and ended a provision that allowed "grandfathered" projects to proceed during a conformity lapse. Following the court ruling, the EPA and USDOT issued guidance to address implementation of conformity requirements based on the court findings. The EPA issued guidance contained in a May 14, 1999 memorandum (EPA, 1999c). In addition, the USDOT issued guidance on June 18, 1999 that incorporates all USDOT guidance in response to the court decision in a single document (USDOT, 1999). On June 30, 2003, the EPA proposed transportation conformity rule amendments to incorporate provisions of the Environmental Defense Fund v. EPA court decision. Table 1-1 summarizes the criteria for conformity determinations for transportation projects, programs, and plans, as specified in amendments to the federal conformity rule.

CONFORMITY RULE REQUIREMENTS

The federal regulations identify general criteria and procedures that apply to all transportation conformity determinations, regardless of pollutant and implementation plan status. These include:

1) Conformity Tests — Sections 93.118 and 93.119 specify emission tests (budget and emission reduction) that the TIP and RTP must satisfy in order for a

TABLE 1-1.
CONFORMITY CRITERIA FROM THE FINAL RULE

Applicability	Pollutant	Section	Requirement
All Actions at All Times	CO, Ozone, PM-10	93.110	Latest Planning Assumptions
		93.111	Latest Emissions Model
		93.112	Consultation
Transportation Plan (RTP)	CO, Ozone, PM-10	93.113(b)	TCMs
		93.118* or 93.119	Emissions Budget or Emission Reduction
TIP	CO, Ozone, PM-10	93.113(c)	TCMs
		93.118* or 93.119	Emissions Budget or Emission Reduction
Project (From a Conforming Plan and TIP)	CO, Ozone, PM-10	93.114	Currently Conforming Plan and TIP
		93.115	Project From a Conforming Plan and TIP
	CO and PM-10	93.116	CO and PM-10 Hot Spots
	PM-10	93.117	PM-10 Control Measures
Project (Not From a Conforming Plan or TIP)	CO, Ozone, PM-10	93.113(d)	TCMs
		93.114	Currently Conforming Plan and TIP
	CO and PM-10	93.116	CO and PM-10 Hot Spots
	PM-10	93.117	PM-10 Control Measures
	CO, Ozone, PM-10	93.118* or 93.119	Emissions Budget or Emission Reduction

Source: Modified from 40 CFR Parts 51 and 93 Transportation Conformity Rule Amendments: Flexibility and Streamlining; Final Rule, Section 91.109(b), “Table 1 - Conformity Criteria”.
*As modified by the June 30, 2003 EPA proposed transportation conformity rule amendments.

determination of conformity to be found. Guidance issued by EPA on May 14, 1999, and proposed as a conformity rule amendment on June 30, 2003, requires a submitted SIP motor vehicle emissions budget to be affirmed as adequate by the EPA prior to use for making conformity determinations. The budget must be used on or after the effective date of EPA's finding of adequacy.

2) Methods / Modeling:

   Latest Planning Assumptions — Section 93.110 specifies that conformity determinations must be based upon the most recent planning assumptions in force at the start of the conformity analysis (EPA, 2003a). This section also requires reasonable assumptions to be made with regard to transit service and changes in projected fares.

   Latest Emissions Models — Section 93.111 requires that the latest emission estimation models specified for use in SIPs must be used for the conformity analysis.

3) Timely Implementation of TCMs — Section 93.113 provides a detailed description of the steps necessary to demonstrate that the new TIP and RTP are providing for the timely implementation of TCMs, as well as demonstrate that the plan and/or program is not interfering with this implementation. Full documentation of this demonstration is included in the TIP.

4) Consultation — Section 93.105 requires that the conformity determination be made in accordance with the consultation procedures outlined in the federal regulations. These include:

   - MAG is required to provide reasonable opportunity for consultation with State air agencies, local air quality and transportation agencies, the USDOT and EPA (Section 93.105(a)(1)).

   - MAG is required to establish a proactive public involvement process which provides opportunity for public review and comment prior to taking formal action on a conformity determination (Section 93.105(e)).

     Under the interagency consultation procedures, the RTP is prepared by MAG staff with guidance from the MAG Transportation Policy Committee, the MAG Management Committee, and the MAG Regional Council. Copies of the Final Draft document are provided to MAG member agencies and others, including the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), EPA, Arizona Department of Transportation (ADOT), ADEQ, Maricopa County Environmental Services Department (MCESD), and the Regional Public Transportation

Authority (RPTA). The RTP is required to be publicly available and an opportunity for public review and comment is provided.

The TIP is prepared by MAG with the assistance of the MAG Modal Committees, Transportation Review Committee, and Transportation Policy Committee. Copies of the Draft TIP are provided to MAG member agencies and others, including ADOT, FHWA, FTA, RPTA, ADEQ, EPA, and MCESD, for review. As with the RTP, the TIP is required to be publicly available and an opportunity for public review and comment is provided. The MAG consultation process for the conformity analysis includes a 30-day comment period followed by a public hearing that is conducted jointly for the TIP and RTP.

AIR QUALITY DESIGNATIONS

Portions of Maricopa County are currently designated as nonattainment for the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), ozone, and particulate matter under ten microns in diameter (PM-10). Air quality plans have been prepared to address carbon monoxide, ozone, and PM-10:

- The Revised MAG 1999 Serious Area Carbon Monoxide Plan, reflecting the repeal of the remote sensing program by the Arizona Legislature in 2000, was submitted to EPA in March 2001;

- The Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in June 2003 (MAG, 2003);

- The EPA approved and promulgated a Revised 1998 15 Percent Rate of Progress Plan for Ozone (Revised ROP FIP) for the Maricopa County nonattainment area, effective August 5, 1999;

- The Serious Area Ozone State Implementation Plan for Maricopa County was prepared by ADEQ and submitted to EPA in December 2000 to meet the Serious Area requirements. No budget is contained in the Serious Area Ozone Plan; and

- The Revised MAG 1999 Serious Area Particulate Plan for PM-10 was submitted to EPA in February 2000.

A summary of the attainment status for each pollutant for the Maricopa County region is provided below, followed by a summary of the applicable conformity test requirements for each pollutant.

Attainment Status

Nonattainment areas in Maricopa County are shown in Figure 1-1. The carbon monoxide and ozone nonattainment areas share a common boundary, encompassing 1,962 square miles (approximately 22 percent) of the county. These boundaries were originally specified in 1974.

Following promulgation of the PM-10 standard in 1987, EPA identified a larger PM-10 nonattainment area in 1990. The PM-10 nonattainment area encompasses 2,916 square miles, consisting of a 48 by 60 mile rectangular grid in eastern Maricopa County, plus a six by six mile section that includes a portion of the City of Apache Junction in Pinal County.

Following the requirements of the 1990 Clean Air Act Amendments, EPA initially identified the MAG region as a "Moderate" nonattainment area for the 8-hour CO standard, with a design value of 12.6 parts per million (ppm), exceeding the current NAAQS of 9.0 ppm. The standard was not achieved by the Clean Air Act deadline of December 31, 1995. The area was reclassified to "Serious" by operation of law in July 1996, with an effective date of August 28, 1996 (EPA, 1996b). The new carbon monoxide attainment date was December 31, 2000. It is important to note that there have been no violations of the carbon monoxide air quality standard in the past six calendar years (1997 through 2002). The State, in a July 23, 1999 letter, requested a carbon monoxide attainment determination from the EPA. In June 2003, the Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA. This document demonstrates that all Clean Air Act requirements have been met and requests that EPA redesignate the area to attainment for carbon monoxide.

On September 22, 2003, EPA published a direct final rulemaking notice determining that the Phoenix metropolitan serious carbon monoxide nonattainment area has attained the carbon monoxide air quality standards by the Clean Air Act deadline of December 31, 2000 (EPA, 2003b).

Under the 1990 Clean Air Act Amendments, the Maricopa County nonattainment area was classified as "Moderate" for the 1-hour ozone standard. The standard was not achieved by the deadline of November 19, 1996. On November 6, 1997, EPA reclassified the area to "Serious" for ozone (EPA, 1997b), effective February 13, 1998 (EPA, 1998a). The new ozone attainment date was November 19, 1999. It is important to note that there have been no violations of the 1-hour ozone air quality standard in the past six calendar years (1997 through 2002). The State, in a February 21, 2000 letter, requested an ozone attainment determination. On May 30, 2001, the Environmental Protection Agency published a final attainment determination for the 1-hour ozone standard (EPA, 2001a). MAG is currently preparing a One-Hour Ozone Redesignation Request and Maintenance Plan which will be submitted to EPA in early 2004.

Under Section 107(d)(4) of the 1990 Clean Air Act Amendments, the PM-10 nonattainment area was initially classified as "Moderate", with an attainment deadline of

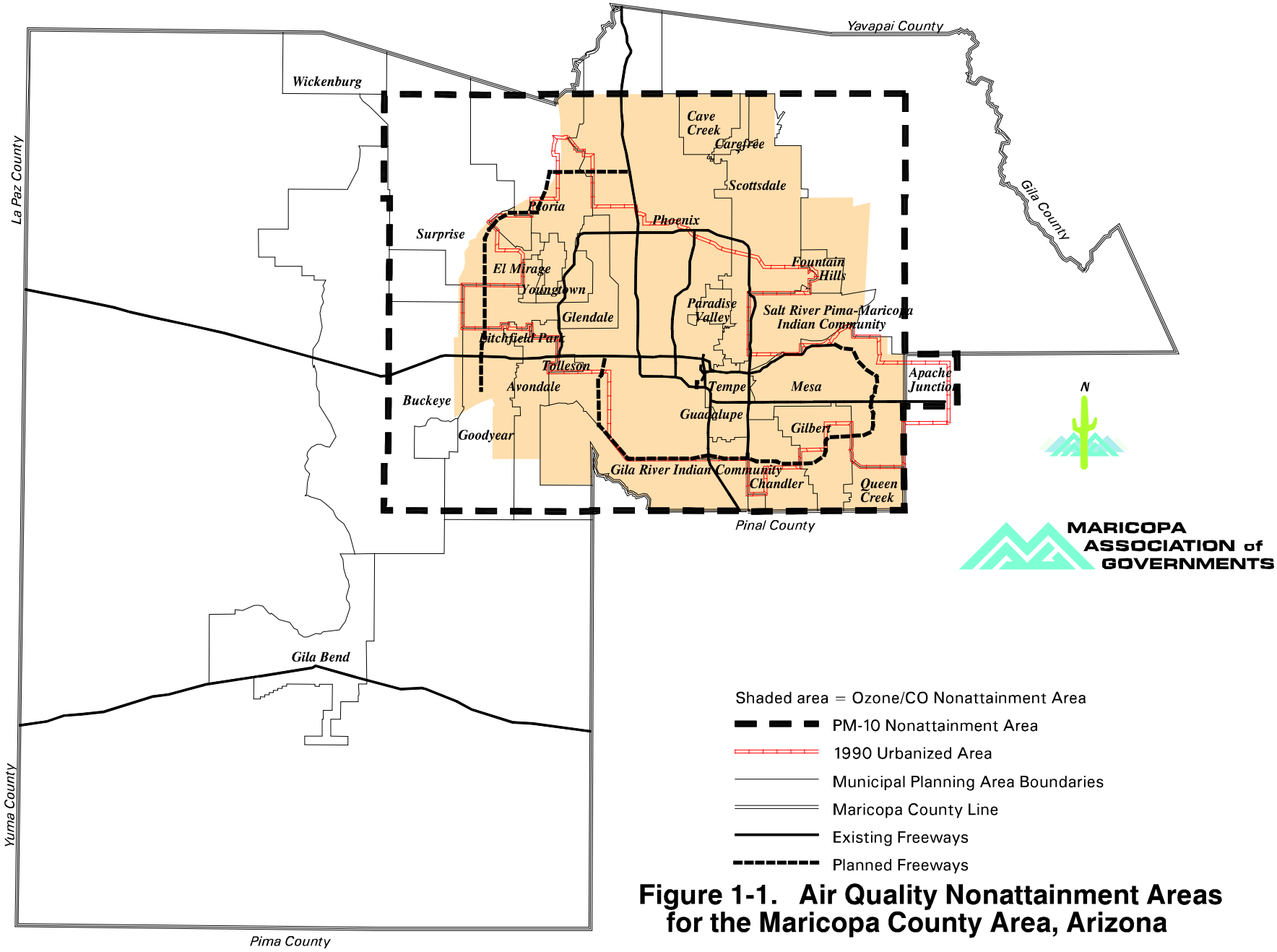


Figure 1-1. Air Quality Nonattainment Areas for the Maricopa County Area, Arizona

December 31, 1994. The standard was not achieved by this date. EPA reclassified the region to "Serious" in May 1996, with an effective date of June 10, 1996 (EPA, 1996a). The new attainment date for PM-10 is December 31, 2001 for Serious areas; however the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area contains a request to extend the attainment date to December 31, 2006, as allowed in the Clean Air Act Amendments (MAG, 2000a).

In the July 25, 2002 *Federal Register*, the Environmental Protection Agency published the final approval of the Revised MAG 1999 Serious Area Particulate Plan for PM-10, including the request to extend the attainment date to December 31, 2006.

CONFORMITY TEST REQUIREMENTS

Specific conformity test requirements established for the MAG nonattainment areas for carbon monoxide, ozone, and PM-10, are summarized below. EPA issued a notice of adequacy for the PM-10 motor vehicle emissions budget on April 21, 2000. In addition, EPA has approved the Revised MAG 1999 Serious Area Particulate Plan for PM-10, including the motor vehicle emissions budget for 2006. The EPA-approved and promulgated Revised Rate of Progress Federal Implementation Plan, effective August 5, 1999, establishes the motor vehicle emissions budget for volatile organic compounds (VOCs) to be used in conducting the ozone conformity budget test for the Maricopa County nonattainment area. The Carbon Monoxide Redesignation Request and Maintenance Plan, submitted to EPA in June 2003, contains a 2006 interim budget and a 2015 maintenance budget for carbon monoxide. On September 29, 2003, EPA found the motor vehicle emissions budgets contained in the Carbon Monoxide Redesignation Request and Maintenance Plan adequate for conformity purposes, effective October 14, 2003 (EPA, 2003c).

Carbon Monoxide

The MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area was submitted to the EPA in July 1999 (MAG, 1999). The MAG 1999 Serious Area Carbon Monoxide Plan used the required EPA emissions model to assess the emission reduction measures required to demonstrate attainment and established a CO emissions budget of 411.6 metric tons per day for 2000 for the modeled area. The EPA issued a notice of adequacy effective December 14, 1999 in the *Federal Register* finding that the submitted CO motor vehicle emissions budget contained in the MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area was adequate for transportation conformity purposes (EPA, 1999b).

The Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area was submitted to the EPA in March 2001 (MAG, 2001a). The Revised Plan reflects the repeal of the Random Onroad Testing Requirements (Remote Sensing Program) from the Vehicle Emissions Inspection Program by the Arizona Legislature in

2000. The Revised Plan used the required EPA emissions model to assess the emission reduction measures required to demonstrate attainment and established a CO emissions budget of 412.2 metric tons per day for 2000 for the modeled area. The EPA issued a notice of adequacy in the *Federal Register* on October 17, 2001, finding that the submitted CO motor vehicle emissions budget contained in the Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area was adequate for transportation conformity purposes (EPA, 2001b). The new conformity budget for CO of 412.2 metric tons per day replaced the previous budget of 411.6 metric tons per day.

In June 2003, the Carbon Monoxide Redesignation Request and Maintenance Plan was submitted to EPA (MAG, 2003). The Maintenance Plan used the EPA-approved MOBILE6 emissions model to develop a 2006 interim budget for carbon monoxide of 699.7 metric tons per day and a 2015 maintenance budget of 662.9 metric tons per day. EPA found the motor vehicle emissions budgets contained in the Carbon Monoxide Redesignation Request and Maintenance Plan adequate for conformity purposes, effective October 14, 2003. According to the proposed amendments to the conformity rule (EPA, 2003a), the conformity budgets in the Carbon Monoxide Maintenance Plan can be applied on or after the effective date of EPA's adequacy finding. The 2006 interim budget will apply to horizon years from 2006 through 2014 (i.e., 2006) and the 2015 budget, to horizon years after 2014 (i.e., 2015, 2016, and 2026). The regional emissions analysis projected for the "Build" scenario for the TIP and RTP must be less than or equal to these budgets.

Ozone

Ozone is a secondary pollutant, generated by chemical reactions in the atmosphere involving volatile organic compounds and nitrogen oxides. EPA approved and promulgated a Revised Rate of Progress (ROP) Federal Implementation Plan (FIP) for the Maricopa County nonattainment area, effective August 5, 1999, that established a motor vehicle emission budget for VOCs of 87.1 metric tons for an average summer (ozone) season day (EPA, 1999a). Since the Revised ROP FIP budget was established in an applicable implementation plan, the approved budget test applies and the emission reduction tests ("Build/No Build" and less than 1990 emissions) do not apply. The regional emissions analysis projected for the "Build" scenario for the TIP and RTP must be less than or equal to this conformity budget. A Serious Area Ozone State Implementation Plan for Maricopa County, submitted to EPA in December 2000, contains no air quality modeling or motor vehicle emissions budget (ADEQ, 2000). Therefore, this Serious Area Ozone Plan has no impact on conformity requirements, processes, or tests, as indicated by EPA in the May 30, 2001 final ruling notice.

On May 30, 2001, EPA published a final rulemaking notice determining that the Phoenix metropolitan serious ozone nonattainment area has attained the 1-hour ozone air quality standard by the Clean Air Act deadline of November 15, 1999. In the notice, EPA also determined that the Clean Air Act requirements for reasonable further progress, attainment determination, and contingency measures are not applicable as long as the Phoenix area continues to attain the 1-hour ozone air quality standard.

Regarding the effect of the determination on transportation conformity, the notice indicates that the EPA set the current ozone conformity budget for the Phoenix metropolitan area in the Federal 15 Percent Rate of Progress Plan. The determination that the 1-hour ozone standard has been attained and that an attainment demonstration and Rate of Progress/Reasonable Further Progress demonstrations are not required will not affect the continued applicability of the existing budget (EPA, 2001a).

Therefore, the applicable motor vehicle emissions budget for VOCs has been established in the Revised ROP FIP for the Maricopa County ozone nonattainment area. The Revised ROP FIP addresses reductions in VOCs, and since it does not include a nitrogen oxides (NOx) analysis, does not establish a NOx budget. The EPA Final Rule on conformity does not require emissions analysis for nitrogen oxides in areas for which the EPA Administrator has determined that NOx emission reductions would not contribute to attainment of the ozone standard. The State of Arizona petitioned EPA for a waiver of NOx requirements in April 1994, based upon modeling results that showed nitrogen oxides reductions would not contribute to attainment. The waiver was approved by the EPA Administrator, effective April 11, 1995, and published in the April 19, 1995 *Federal Register* (EPA, 1995a).

PM-10

The Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to the EPA in February 2000 (MAG, 2000a). The Clean Air Act attainment date is December 31, 2001 for Serious PM-10 Areas; however, the Revised MAG 1999 Serious Area Particulate Plan for PM-10 contains a request to extend the attainment date to December 31, 2006, as allowed in the Clean Air Act Amendments. The Revised MAG 1999 Serious Area Particulate Plan for PM-10 used the required EPA emission model to assess the emission reduction measures required to demonstrate attainment and established a PM-10 emissions budget of 59.7 metric tons per day applicable for both the annual average and 24-hour PM-10 standards in 2006 for the modeled area. The EPA issued a notice of adequacy, effective April 21, 2000 in the *Federal Register* finding that the submitted PM-10 motor vehicle emissions budget contained in the Revised MAG 1999 Serious Area Particulate Plan for PM-10 was adequate for transportation conformity purposes (EPA, 2000a). The regional emissions analysis projected for the “Build” scenario for the TIP and RTP must be less than or equal to the budget established by this Plan.

Section 93.122(d)(2) of the federal conformity rule requires that PM-10 from construction-related fugitive dust be included in the regional PM-10 emissions analysis, if it is identified as a contributor to the nonattainment problem in a PM-10 implementation plan. The motor vehicle emissions budget established in the Revised MAG 1999 Serious Area Particulate Plan for PM-10 includes regional reentrained dust from travel on paved roads, vehicular exhaust, travel on unpaved roads, and road construction. Therefore, emissions from road construction are included as part of the PM-10 estimates developed for this conformity analysis.

ANALYSIS YEARS

For the 2003 MAG Conformity Analysis regional emissions will be estimated for the horizon years 2006, 2015, 2016, and 2026 for carbon monoxide, volatile organic compounds and PM-10. For the selection of horizon years, the conformity rule requires: (1) that if the attainment year is in the time span of the transportation plan, it must be modeled; (2) the last year forecast in the transportation plan must be a horizon year; and (3) horizon years may be not more than ten years apart. The attainment years for ozone and carbon monoxide were 1999 and 2000, respectively. The years 1999 and 2000 are not within the time span of the TIP or RTP and, therefore, do not need to be modeled. The year 2006 is modeled for PM-10, because it is the attainment year in the Serious Area PM-10 Plan and is also within the time span of the RTP. The year 2006 is modeled for carbon monoxide because there is an interim budget for this year in the Carbon Monoxide Maintenance Plan. The year 2006 is the first year modeled for volatile organic compounds that is within the time span of the RTP. The year 2015 is a horizon year because it is the maintenance year in the Carbon Monoxide Maintenance Plan. The year 2026 is modeled because it is the last year of the Regional Transportation Plan. The year 2016 is modeled because it meets the federal conformity requirement that horizon years be no more than ten years apart (e.g., 2016 to the horizon year, 2026).

2 LATEST PLANNING ASSUMPTIONS

The Clean Air Act states that "the determination of conformity shall be based on the most recent estimates of emissions, and such estimates shall be determined from the most recent population, employment, travel, and congestion estimates as determined by the MPO or other agency authorized to make such estimates." On January 18, 2001, the USDOT issued guidance developed jointly with EPA to provide additional clarification concerning the use of latest planning assumptions in conformity determinations (USDOT, 2001).

Key elements of this new guidance are identified below:

- Areas are strongly encouraged to review and strive towards regular five-year updates of planning assumptions, especially population, employment, and vehicle registration assumptions.

- The latest planning assumptions must be derived from the population, employment, travel and congestion estimates that have been most recently developed by the MPO (or other agency authorized to make such estimates) and approved by the MPO.

- Conformity determinations that are based on information that is older than five years should include written justification for not using more recent information. For areas where updates are appropriate, the conformity determination should include an anticipated schedule for updating assumptions.

The latest planning assumptions used in the 2003 MAG Conformity Analysis are summarized in Table 2-1. The methodology and scheduled updates for the planning assumptions are discussed below.

Recently proposed revisions to the conformity rule (EPA, 2003a) indicate that "the conformity determination must satisfy the requirements...using the planning assumptions available at the time the analysis begins as determined through the interagency consultation process." The planning assumptions described in Table 2-1 are the latest available assumptions.

TABLE 2-1.
LATEST PLANNING ASSUMPTIONS FOR MAG CONFORMITY DETERMINATIONS

Assumption	Source	MAG Models	Next Scheduled Update
Population	Under Governor's Executive Order 95-2, official county projections are updated every 5 years by the Arizona Department of Economic Security (DES) after a census; projections must be used by all agencies for planning purposes; DES is still awaiting year 2000 county migration data from the U.S. Census Bureau; MAG used ASU projections with 2000 Census data and state-of-the-art land use models to develop interim socioeconomic projections; these were accepted by the MAG Regional Council in June 2003.	DRAM/ EMPAL; SAM-IM	Official socioeconomic projections based on DES county projections may be approved by the MAG Regional Council in 2004.
Employment	County control totals are based on the official DES population projections; since these are not available (see above), MAG used ASU county-level projections and 2000 Employment Survey and state-of-the-art land use models to develop interim socioeconomic projections; these were accepted by the MAG Regional Council in June 2003.	DRAM/ EMPAL; SAM-IM	Official socioeconomic projections based on DES county projections may be approved by the MAG Regional Council in 2004.
Traffic Counts	Transportation models were validated in 2002 using approximately 3,000 traffic counts collected in 1998.	EMME/2	New traffic counts were collected in 2002; the data is being tabulated and when available, will be used to validate the transportation models.
Vehicle Miles of Travel	Transportation models were calibrated in 2001 based on a 1989 home interview survey and a 1995 on-board bus survey.	EMME/2	A 4,000 Household Travel Survey was conducted in 2001; the data is being tabulated and when available, will be used to re-calibrate the transportation models.
Speeds	Transportation models were validated using survey data on peak and off-peak highway speeds collected in 1993.	EMME/2	A travel time study was conducted in 2003; the data is being tabulated and will be used to validate the speeds output by the transportation models in early 2004.
Vehicle Registrations	2002 vehicle registrations were provided by ADOT.	MOBILE6	When newer data are available from ADOT in MOBILE6 model format.
Implementation Measures	Latest implementation status of commitments in prior SIPs.	N/A	Updated for every conformity analysis.

POPULATION AND EMPLOYMENT

In accordance with the Arizona Governor's Executive Order 95-2, the population projections used for all State agency planning purposes are updated by the Arizona Department of Economic Security (DES) every five years after a decennial or mid-decennial census. Unfortunately, the U.S. Census Bureau has still not made available the 2000 in-migration and out-migration data by county, data that are needed by DES to prepare the official county projections. In the meantime, MAG has prepared interim projections by traffic analysis zone (TAZ), based on Maricopa County projections developed by the Arizona State University Center for Business Research (ASU), and data from the 2000 U.S. Census, the 2000 MAG Employment Survey, and the MAG GIS and Database Enhancement Study. MAG allocated the ASU projections for Maricopa County to TAZs using the DRAM/EMPAL and Subarea Allocation Model-Information Manager (SAM-IM) land use models. These interim socioeconomic population and employment projections were accepted by the MAG Regional Council in June 2003. The travel and congestion estimates for the 2006, 2015, 2016, and 2025 "Build" scenarios in the 2003 MAG Conformity Analysis are based on these latest population and employment projections accepted by the MAG Regional Council. MAG will prepare final population and employment projections by TAZ, when DES releases the official county projections, as required by Executive Order 95-2. It is expected that these final TAZ projections will be available sometime in 2004.

Methodology

DES prepares the official Arizona population projections by county, using census data. However, since the DES projections were not available, MAG used ASU projections for Maricopa County, based on the 2000 Census. These population and employment projections for Maricopa County were "stepped down" to smaller geographic areas by MAG using the latest available data and state-of-the-art land use models. The nationally-recognized DRAM/EMPAL model was used to allocate county projections of households and employment to 147 regional analysis zones (RAZs) based upon the pre-existing location of these activities, land consumption, and transportation system accessibility. The allocation of population and employment from RAZs to one-acre grids was accomplished with a GIS-based model called SAM-IM which assesses the suitability of each grid for development based on measures such as adjacent land use, highway access, and proximity to other development. Population and employment at the one-acre level is aggregated to TAZs using SAM-IM. These interim socioeconomic projections were accepted by the MAG Regional Council in June 2003.

Next Scheduled Update

The next update of the TAZ population and employment projections will be based on the official DES county-level projections, required by Executive Order 95-2. These projections are not currently available because DES is awaiting release of 2000 in-migration and out-migration data by county from the U.S. Census Bureau. When the DES county-level

projections are available, it is anticipated that MAG will allocate the Maricopa County projections to TAZs using the DRAM/EMPAL and SAM-IM land use models. This MAG modeling will take approximately six months to complete and the final TAZ projections should be available in 2004.

TRAFFIC COUNTS

Enhancements to the mode choice component of the MAG transportation models have recently been completed and the transportation modeling domain has been expanded from 1,541 TAZs to 1,995 TAZs. The new models were validated in 2002, using approximately 3,000 traffic counts collected in 1998. The validation demonstrated a good statistical fit between actual and estimated daily traffic volumes, as measured by a root mean square error of 36 percent. The transportation conformity rule Section 93.122(b)(1)(i) specifies that network-based transportation models need to be validated against observed counts for a base year that is not more than ten years prior to the date of the conformity determination.

Methodology

MAG uses EMME/2 software to perform traffic and transit assignments. The MAG transportation models follow a traditional four-step process: trip generation, trip distribution, mode choice, and traffic/transit assignment. Trip generation determines the number of person trips produced and attracted by traffic analysis zone. Trip distribution links the productions and attractions by TAZ. The recently updated mode choice model determines the number of person trips allocated to each of the following modes: auto drivers, two person carpools, three or more person carpools, express bus, local bus, and rail. The mode choice model is sensitive to highway and transit travel times, as well as pricing variables such as automobile operating costs, parking costs, and transit fares. Highway and transit route choice is determined in the assignment step, based on operating costs, travel times, and distances. Capacity-restrained traffic assignments are performed for the AM peak period, midday, the PM peak period, and nighttime. A feedback loop between traffic assignment and trip distribution is utilized to achieve near-equilibrium highway speeds. A peak spreading model is applied to derive the AM and PM peak hour traffic volumes. The transportation models are fully documented in the “Draft MAG Travel Demand Model Documentation” (MAG, 2002).

Next Scheduled Update

The MAG FY 2002 Unified Planning Work Program provided $80,000 for a comprehensive Traffic Count Study. The traffic count study was conducted during 2002. When the data is compiled, it will be used to validate the MAG transportation models.

VEHICLE MILES OF TRAVEL

The MAG transportation models were calibrated in 2001 based on a 1989 household travel survey and a 1995 on-board bus survey. The models, described above, simulate peak and daily traffic volumes on more than 30,000 highway links, as well as transit trips on bus and rail routes. Vehicle miles of travel by link, output by the highway assignment process, are input to the emissions models used in conformity, after being reconciled with Highway Performance Monitoring System (HPMS) vehicle miles of travel (VMT).

Methodology

For serious nonattainment areas the transportation conformity guidance in Section 93.122(b)(3), as amended August 15, 1997, states that:

> Highway Performance Monitoring System estimates of vehicle miles traveled shall be considered the primary measure of VMT within the portion of the nonattainment or maintenance area and for the functional classes of roadways included in HPMS, for urban areas which are sampled on a separate urban area basis. For areas with network-based travel models, a factor (or factors) may be developed to reconcile and calibrate the network-based travel model estimates of VMT in the base year of its validation to the HPMS estimates for the same period. These factors may then be applied to model estimates of future VMT. In this factoring process, consideration will be given to differences between HPMS and network-based travel models, such as differences in the facility coverage of the HPMS and the modeling network description.

In conformity analyses conducted prior to 2002, transportation model VMT was not reconciled with HPMS, because the former closely approximated HPMS VMT. This close approximation is evident in the annual VMT tracking reports submitted to EPA to satisfy a MAG commitment in the Revised MAG 1999 Serious Area Carbon Monoxide Plan. The final vehicle miles of travel tracking report was submitted to EPA in 2001 (MAG, 2001b). To ensure that the output of the updated MAG transportation models continues to track HPMS vehicle miles of travel and comply with conformity guidance quoted above, MAG has developed factors to reconcile estimates of VMT from the 1998 transportation model validation year with 1998 HPMS VMT. The derivation of these factors is detailed in Appendix D.

The methodology to derive the HPMS reconciliation factors relies on a comparison of 1998 HPMS VMT with the transportation model VMT that has been validated against 3,000 traffic counts for 1998. The 1998 HPMS data was submitted to the Federal Highway Administration by the Arizona Department of Transportation (ADOT) on October 7, 1999. Appendix D provides ADOT's 1998 HPMS summary tables for urbanized and donut areas. The Maricopa County PM-10 Nonattainment Area is represented by Urbanized Area #33 plus Donut Area #33. The HPMS VMT and 1998 VMT from the validated transportation

models were summarized by HPMS functional systems and comparable model facility types to develop the appropriate factors, shown in Table 2-2.

After the HPMS data is converted from annual average daily traffic (AADT) to average weekday traffic (AWDT), the difference between the total 1998 HPMS and transportation model VMT for the urbanized area is less than one percent. HPMS VMT in the urbanized area is higher for freeways, collectors and locals, while arterial VMT is lower than the transportation model estimates.

To achieve consistency with the HPMS VMT distribution by functional system, the urbanized area factors in Table 2-2 below are applied to the VMT by facility type for transportation model links located in the urbanized area. The urbanized area boundaries are illustrated in Figure 1-1.

The area inside the PM-10 nonattainment area, but outside the urbanized area, is called the HPMS "donut area". Less than ten percent of the 1998 VMT in the Maricopa County PM-10 nonattainment area occurs in the "donut area". In addition to the differences in the distribution of VMT by HPMS functional system, the transportation models overestimate total VMT in the "donut area". To achieve consistency with HPMS, the donut area factors in Table 2-2 are applied to the traffic volumes by facility type for transportation model links located in the "donut area".

TABLE 2-2.
HPMS RECONCILIATION FACTORS

Applied to Transportation Model Link VMT (By Facility Type)	In Urbanized Area #33	In Donut Area #33
Freeways (#1 + #7 + #8 + #10)	1.0682	0.7577
Arterials (#2 + #4 + #6 + #9)	0.8674	0.6153
Collectors (#3)	1.0000	0.7094
Locals (#5)	1.5305	0.5954

Due primarily to the adjustments in the "donut area", reconciling 1998 transportation model VMT with HPMS reduces total VMT in the nonattainment area by 4.8 percent. It is important to note, however, that 90 percent of this reduction occurs outside the urbanized area, whereas, most emissions due to on-road mobile sources are concentrated inside the urbanized area.

For each horizon year, the appropriate HPMS reconciliation factor in Table 2-2 has been applied to the transportation model VMT on each link, based on its facility type (#1- #10) and location (in the urbanized area or "donut area"). The HPMS-factored VMT is then input to the M6Link program to calculate onroad mobile source emissions for the 2003 MAG Conformity Analysis.

Next Scheduled Update

Updates to the transportation models have recently been completed, including improvements to the mode choice model (i.e. nested logit) and implementation of the latest release of the EMME/2 software. The MAG FY 2001 Unified Planning Work Program programmed $500,000 to conduct an activity diary-based travel survey of 4,000 households. The survey instruments were distributed to randomly-selected households during 2001. When the survey data are compiled, it is anticipated that the results will be used to update and re-calibrate the MAG transportation models.

SPEEDS

Speeds obtained from the capacity-restrained traffic assignments are "fed-back" in the travel demand modeling chain. The trip distribution, mode choice, and traffic assignment steps of the chain are executed until AM peak period trip tables and link volumes are in equilibrium (root mean square error of five percent or less). In addition to vehicle miles of travel, the MAG transportation models calculate system performance measures such as vehicle hours of travel and volume to capacity ratios. AM peak, midday, PM peak, nighttime, and daily speeds by highway link are derived from the volume to capacity ratios estimated by the MAG transportation models.

Methodology

A minimum of five iterations are required to achieve equilibrium. Periodically, MAG conducts speed studies to compare model-estimated speeds with empirical data. The last speed study was conducted in 1993. A comparison of transportation model-estimated and observed 1993 vehicle hours of travel (VHT) for the PM peak period is provided in Table 2-3 below.

Model-estimated speeds in this table represent the output of the transportation models used in prior conformity analyses, since there is no 1993 highway network coded for the 1,995 TAZ system. However, the volume/delay functions used in the latest transportation models have not changed, so the modeled speeds should be similar.

Overall, the transportation model-estimated VHT for 1993 is eight percent higher than the VHT observed in the speed study. Since VMT/VHT is equivalent to average speed, VHT is inversely-related to average speed. On average, the 1993 VHT for the region is eight percent higher than observed VHT, although for some facility and area types (i.e. freeways

and arterials in the central business districts (CBD), suburban freeways, rural arterials), VHT is lower than the observed. It should be noted that there may be considerable variation in these estimates on a link-by-link basis.

Next Scheduled Update

The MAG FY 2002 Unified Planning Work Program contained $300,000 for a MAG Travel Speed Study. The speed study was conducted in 2003. When compilation of the data is completed, the new speeds will be used to validate speeds used in and output by the MAG transportation models. It is anticipated that this will occur in early 2004.

TABLE 2-3.
RATIO OF ESTIMATED/OBSERVED VEHICLE HOURS OF TRAVEL*
1993 PM PEAK PERIOD

	Area Type **					
Facility Type	1	2	3	4	5	All
Freeway	0.962	1.180	1.170	0.978	1.123	1.112
Expressway	----	1.378	1.172	1.294	----	1.271
Collector	----	1.088	1.458	1.277	1.103	1.299
6-Leg Arterial	0.768	0.940	1.469	1.074	----	1.217
Arterial	0.976	1.098	1.081	1.063	0.966	1.066
Freeway Ramp	----	----	1.202	----	----	1.202
Total	0.950	1.107	1.107	1.062	0.986	1.080

*Vehicle Miles of Travel/Vehicle Hours of Travel=Average Speed
** Area Type 1 = CBD, Area Type 2 = Outlying, Area Type 3 = Mixed Urban, Area Type 4 = Suburban, Area Type 5 = Rural

VEHICLE REGISTRATIONS

Vehicle registrations for 2002 are the latest provided to MAG by the Arizona Department of Transportation, Motor Vehicle Division. The 2002 vehicle registration distribution has been converted to MOBILE6 format. MAG will use newer vehicle registration data when available from ADOT in the format required by the MOBILE6 emissions model.

IMPLEMENTATION MEASURES

Committed control measures in the applicable air quality plans that reduce mobile source emissions are shown in Table 2-4. Specific control measures for which emission reduction credit was assumed in the 2003 MAG Conformity Analysis are identified in Chapter 4 on Air Quality Modeling. The emission reductions assumed for these committed measures reflect the latest implementation status of these measures. In subsequent conformity analyses, MAG will reflect the latest implementation status of all measures for which emissions reduction credits are assumed. As required by the conformity rule, the applicable transportation control measures (TCMs) are fully documented in Chapter Five of the 2003 Conformity Analysis report.

TABLE 2-4.
SIP MEASURES ASSUMED IN THE 2003 MAG CONFORMITY ANALYSIS

SIP Measure	Reference	Measure Description	Pollutant(s)
1	Serious Area CO Plan CO Maintenance Plan	Phased-In I/M Cutpoints	CO, Ozone PM-10
3	Serious Area CO Plan CO Maintenance Plan	One-Time I/M Waiver	CO, Ozone PM-10
9	Serious Area CO Plan CO Maintenance Plan	Tougher Registration Enforcement	CO, Ozone PM-10
14 14	Serious Area CO Plan CO Maintenance Plan Serious Area PM-10 Plan	Clean Burning Gasoline	CO, Ozone PM-10
25 26	Serious Area CO Plan CO Maintenance Plan Serious Area PM-10 Plan	Intelligent Transportation Systems	CO, Ozone PM-10
41 58	Serious Area CO Plan CO Maintenance Plan Serious Area PM-10 Plan	Traffic Signal Synchronization	CO, Ozone PM-10
39	Serious Area PM-10 Plan	Strengthening and Better Enforcement of Fugitive Dust Control Rules-Construction Dust	PM-10
40	Serious Area PM-10 Plan	Reduce Particulate Emissions from Unpaved Roads and Alleys	PM-10
50	Serious Area PM-10 Plan	PM-10 Efficient Street Sweepers	PM-10
69	Serious Area PM-10 Plan	Paving, Vegetating, and Chemically Stabilizing Unpaved Access Points Onto Paved Roads	PM-10
70	Serious Area PM-10 Plan	Curbing, Paving, or Stabilizing Shoulders on Paved Roads	PM-10

Sources:
(1) Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area, (MAG, 2000a).
(2) Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area, (MAG, 2001a).
(3) Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area, (MAG, 2003).

3 TRANSPORTATION MODELING

The transportation modeling performed for the 2003 MAG Conformity Analysis is based on the latest planning assumptions, as required in the federal conformity rule (40 CFR 93.110) and documented in Chapter 2. A summary of the transportation model characteristics, key socioeconomic data, and other data related to the land use and transportation system forecasts is provided in this chapter.

TRANSPORTATION MODELS

MAG regional transportation modeling is performed using EMME/2 software for both highway and transit network assignments. The transportation models forecast AM peak period, midday, PM peak period, and nighttime vehicle traffic, as well as daily transit ridership, for the MAG transportation modeling area. The transportation modeling area currently contains 1,995 traffic analysis zones, covering an area of approximately 6,500 square miles.

The latest calibration of the transportation models was completed in 2001, using data from the 1989 household travel survey and the 1995 on-board bus survey. The latest validation of the transportation models was completed in 2002 using traffic counts collected in 1998.

The MAG transportation models exhibit the following characteristics, which are consistent with requirements identified in the federal transportation conformity rule (Section 93.122):

- The 1998 traffic volumes simulated by the MAG transportation models have been validated against approximately 2,942 traffic counts. This validation demonstrated a good statistical fit between actual and estimated 24-hour 1998 traffic volumes, as measured by a root mean square error of 36 percent. The MAG transportation models are fully documented in the "Draft MAG Travel Demand Model Documentation" (MAG, 2002).

- The population, households, and employment inputs to the travel demand models are based on the latest interim socioeconomic projections accepted by the MAG Regional Council in June 2003. These projections were prepared using the DRAM/EMPAL land use model and the MAG Subarea Allocation Model-Information Manager (SAM-IM), as well as data from the ASU Center for Business Research, the 2000 Census, and the 2000 MAG Employment Survey for Maricopa County.

- The population and employment projections used in the conformity analysis are consistent with the transportation system alternatives considered. In the MAG land use models, transportation system accessibility influences the allocation of population and employment to smaller geographic areas. The DRAM/EMPAL model distributes County-level projections of households and employment to 147 regional analysis zones (RAZs) based upon the pre-existing location of these activities, land use consumption rates, and transportation system accessibility, expressed in terms of PM peak travel times. These congested travel times are derived from an appropriate EMME/2 capacity-restrained traffic assignment for each forecast year. The allocation of population, households and employment from RAZs to one-acre grid cells is accomplished with SAM-IM. SAM-IM uses transportation system accessibility measures, such as proximity to the closest highway, in determining the likelihood that a one-acre grid will develop during a given forecast interval. SAM also aggregates population, households, and employment projections by one-acre grid to the TAZ-level for input to EMME/2. Congested travel times output by the EMME/2 transportation models are "fed-back" into the land use models to ensure that there is consistency between the transportation system assumptions and the land use projections.

- The EMME/2 transportation models perform capacity-restrained traffic assignments. Restrained assignments are produced for the AM peak period, midday, PM peak period, and nighttime, with volumes and congestion estimated for each period. A peak spreading model is used to derive AM and PM peak hour traffic volumes.

- Speeds obtained from the capacity-restrained traffic assignments are "fed-back" in the travel demand modeling chain. The trip distribution, mode choice, and traffic assignment steps of the chain are executed until AM peak period trip tables and link volumes are in equilibrium (root mean square error of five percent or less). A minimum of five iterations are required to achieve equilibrium. The travel impedances used in the mode choice model include travel times and costs associated with each of the following modes: auto-drivers, carpools (2 and 3+ persons), and transit (i.e. express bus, local bus, and rail).

- The travel impedances used in the trip distribution and traffic assignment steps of the MAG travel demand models are a composite function of highway travel times and costs. The MAG nested logit mode choice model is sensitive to highway and transit travel times, as well as pricing variables, such as automobile operating costs, parking costs, and transit fares.

- As a result of the feedback loop in the MAG travel demand modeling process, the final peak and off-peak speeds are sensitive to the capacity-restrained volumes on each highway segment represented in the network. Data from the 1993 MAG Travel Speed Study has been used to ensure that the capacity-restrained speeds and delays output by the transportation models are consistent with empirical data.

The assigned speeds used in the last iteration of the models are in reasonable agreement with speed data collected in the 1993 MAG Travel Speed Study (MAG, 1995). Table 2-3 provides a comparison of 1993 model-estimated and observed vehicle hours of travel (VHT) for the PM peak period. Overall, the model-estimated PM peak VHT for 1993 was eight percent higher than the 1993 survey data. MAG conducted a new speed study in the Spring of 2003 in order to validate the VHT, speeds, and other performance measures output by the latest transportation models. The model validation based on new speed data will be updated in early 2004. (See Table 2-1.)

- The MAG travel demand models estimate average weekday traffic, while the Arizona Highway Performance Monitoring System (HPMS) reports annual average daily traffic. In addition, HPMS VMT is reported for the urbanized and donut areas of the PM-10 nonattainment area, which is smaller than the transportation modeling area. In some cases the functional classes used in HPMS are not consistent with the facility types used in transportation modeling. In accordance with conformity guidance in Section 93.122(b)(3), MAG has developed factors to reconcile these differences between transportation model VMT by facility type and HPMS VMT by functional system. These factors were developed by comparing VMT from the 1998 transportation model validation with 1998 HPMS data the Arizona Department of Transportation submitted to the Federal Highway Administration on October 7, 1999. The HPMS reconciliation factors shown in Table 2-2 have been applied for all horizon years in the 2003 MAG Conformity Analysis.

SOCIOECONOMIC PROJECTIONS

Section 93.110 of the federal conformity rule requires that the population and employment projections used in the conformity analysis be the most recent estimates that have been officially approved by the Metropolitan Planning Organization (i.e., MAG for this region). The 2003 MAG Conformity Analysis is based on interim socioeconomic population projections accepted by the MAG Regional Council in June 2003.

In accordance with the Arizona Governor's Executive Order 95-2, the population projections used for all State agency planning purposes are updated by the Arizona Department of Economic Security (DES) every five years after a decennial or mid-decennial census. Unfortunately, the U.S. Census Bureau has still not made available the 2000 in-migration and out-migration data by county, data that are needed by DES to prepare the official county projections. In the meantime, MAG has prepared interim socioeconomic projections by traffic analysis zone (TAZ), based on Maricopa County projections developed by the Arizona State University Center for Business Research (ASU), as well as data from the 2000 U.S. Census, the 2000 MAG Employment Survey and the MAG GIS and Database Enhancement Study. MAG allocated the ASU projections for Maricopa County to TAZs using the DRAM/EMPAL and Subarea Allocation Model -

Information Manager (SAM-IM) land use models. These interim socioeconomic population and employment projections were accepted by the MAG Regional Council in June 2003.

The interim TAZ population, households and employment projections take into account the transportation improvements contained in the conforming TIP (FY 2003-2007) and Long Range Transportation Plan 2002 Update in effect at the time the projections were accepted. For the 2003 MAG Conformity Analysis, the interim projections of population, households, and employment by TAZ were input to the MAG transportation models to estimate auto and transit trips, VMT, and congestion for each "Build" scenario.

When official DES county projections are prepared in accordance with Executive Order 95-2, MAG will use the DRAM/EMPAL and SAM-IM land use models to prepare a final set of TAZ projections, based on the 2000 Census, the 2000 MAG Employment Survey, and the MAG GIS and Database Enhancement Study. It is anticipated that these socioeconomic projections may be approved by the MAG Regional Council sometime in 2004. (See Table 2-1.)

TRAFFIC ESTIMATES

A summary of the population, employment, and travel characteristics for the MAG transportation modeling area for each scenario in the 2003 MAG Conformity Analysis is presented in Table 3-1. Freeway lane mileage was derived from the MAG travel models and includes freeway ramps. The vehicle miles of travel forecasts for each of the pollutant modeling areas are presented in Appendix C.

Highway Network Assumptions

Not all of the street and freeway projects included in the TIP qualify for inclusion in the highway network. Projects which call for study, design, right-of-way acquisition, or non-capacity improvements have not been included in the networks. When these projects result in actual facility construction projects, the associated capacity changes will be coded into the network, as appropriate. Since the networks define capacity in terms of number of through traffic lanes, only construction projects that increase the lane-miles of through traffic are included.

Generally, MAG highway networks include only the one-mile grid system of streets, plus freeways. This includes all streets classified as arterials, as well as some collectors. Half-mile streets are not generally coded on the network, because their inclusion would increase computer processing time to unacceptable levels (i.e. multiple weeks per scenario). For similar reasons, local street improvements contained in the TIP are not coded on the highway network.

Traffic on collectors and local streets not explicitly coded on the highway network is simulated in the models by use of abstract links called "centroid connectors". These

TABLE 3-1. TRAFFIC NETWORK COMPARISON FOR SCENARIOS EVALUATED FOR 2003 MAG CONFORMITY ANALYSIS

Year	Total Population[a] (thousands)	Employment[a] (thousands)	Scenario	Average Weekday VMT[b] (millions)	Average P.M. Peak Speed[c]	Freeway Lane Miles[d]
2003	3,581	1,789	Base Year	104.9	21.6	2,257
2006	3,956	1,970	Build	117.4	18.9	2,446
2015	5,158	2,544	Build	162.9	23.3	3,548
2016	5,298	2,611	Build	168.1	22.4	3,586
2026	6,626	3,279	Build	221.2	16.7	4,213

a Population and employment estimates are for the transportation modeling area. Total population includes resident population in households and group quarters. Total employment includes self-employed individuals.

b Vehicle miles of travel (VMT) for the transportation modeling area before reconciliation with the Highway Performance Monitoring System (HPMS).

c Average speed on freeways, expressways, and arterials during the P.M. peak hour.

d Ramps and HOV lanes are included in the lane miles reported for freeways.

represent collectors, local streets, and driveways which connect a neighborhood to a regionally-significant roadway. Centroid connectors also include travel occurring on public and private unpaved roads.

Coding Conventions

Specific coding conventions or criteria are applied to determine whether a project qualifies for highway network coding. This results in coding of all arterial streets and some collectors. The coding conventions are:

(1) Capacity-related projects on existing links or extensions of existing links on

the 2003 highway network are coded in future "Build" networks. This includes projects on freeways, the mile-street grid, and half-mile streets already on the 2003 network.

(2) Capacity-related projects which are not on links or extensions of links in the 2003 network are coded, if the street is considered a logical part of the one-mile street grid system. If the project is on a half-mile street, it will be considered for inclusion on a case-by-case basis. The key factors considered in making this assessment include:

- the density of current and future development and travel in the area of the project;
- whether the change may be accommodated without increasing the number of zones; and
- whether the change is consistent with standard network coding practices.

The "Build" highway networks for the conformity analysis were developed using the 2003 highway network as a base. The 2003 highway network includes all qualifying projects from the first year of the conforming FY 2003-2007 TIP and freeways scheduled to be open to traffic by December 31, 2003. The 2006 "Build" network includes qualifying projects from the FY 2004-2007 TIP and freeways scheduled to be open to traffic by December 31, 2006. The 2015 "Build" network assumes implementation of qualifying projects scheduled in the MAG Regional Transportation Plan, through the year 2015, as well as qualifying projects scheduled in the TIP. The 2016 "Build" network assumes implementation of qualifying projects scheduled in the RTP, through the year 2016, as well as qualifying projects scheduled in the TIP. The 2026 "Build" network assumes implementation of the entire MAG Regional Transportation Plan, as well as qualifying projects scheduled in the TIP.

TRANSIT NETWORKS AND OPERATIONS

Transit networks are input to the mode choice step of the MAG transportation models to determine the number of person trips made by transit (bus and rail) and, concurrently, the number of auto trips removed from the highway. For the 2006, 2015, 2016, and 2026 "Build" scenarios, the bus service and rail networks will reflect the latest assumptions provided by the Regional Public Transportation Authority.

Information on transit ridership and operating policies is provided in the Annual Transit Performance Report FY2002/FY2003 (RPTA, 2003b), which was prepared by the Regional Public Transportation Authority. Information on current transit fares is provided in Table 3-2 (RPTA, 2003a). The information on fares and transit operations in this section of the conformity analysis is provided to address federal transportation conformity requirements.

Current Fixed Route Service

Valley Metro fixed route scheduled service is provided to an area of approximately 600 square miles within the MAG region by Avondale, Chandler, Gilbert, Glendale, Goodyear, Litchfield Park, Mesa, Peoria, Phoenix, RPTA, Scottsdale, Tempe, Tolleson, and the Sun City area of Maricopa County. Fixed route service includes 60 local routes and 21 routes of express bus service. There were 43,523,952 total boardings in FY 2001-2002, which is an increase of approximately 10.7 percent over the previous fiscal year. Summary statistics for the fixed route services are provided below for the past fiscal year (FY 2001-2002).

- Mesa had a total of 1,252,592 boardings in 1,480,487 revenue miles and 90,642 revenue hours of service.

- Phoenix recorded 36,642,732 boardings in 14,498,806 revenue miles and 941,752 revenue hours of service. The City of Scottsdale provides service through intergovernmental agreements with both the City of Phoenix and the RPTA.

- Valley Metro/RPTA provided service carrying 3,726,713 passengers in the past year with a total of 3,246,709 revenue miles in 230,737 revenue miles of service.

- Tempe recorded 3,865,511 passenger boardings in 3,730,509 revenue miles and 350,657 revenue hours of service.

- Glendale boarded 36,404 passengers in the past year with a total of 89,650 revenue miles in 3,876 revenue hours of service.

Other Existing Transit Services

Ten paratransit systems operate within Maricopa County, including East Valley Dial-A-Ride, El Mirage Dial-A-Ride, Glendale Dial-A-Ride, Guadalupe Special Services, Paradise Valley Dial-A-Ride, Peoria Dial-A-Ride, Phoenix Dial-A-Ride, Route 131 (START) ADA, Sun Cities Area Transit, and Surprise Dial-A-Ride. These services generally operate within the area with fixed route bus service. The total number of boarding passengers in FY 2001-2002 was 1,023,885 with 7,034,138 revenue miles.

The Maricopa County Special Transportation Services department operates prescheduled service. Transportation is provided for eligible persons, which includes seniors, persons with disabilities, and low income individuals, for specific trip purposes in portions of Maricopa County unserved by other systems. This service provides public transportation to individuals in outlying areas of the region. Vanpool service operated by Valley Metro is

discussed in Chapter 5, which reviews transportation control measures that have been implemented in the region.

TABLE 3-2. TRANSIT FARES IN EFFECT AT THE TIME OF COMPLETION OF THE 2003 MAG CONFORMITY ANALYSIS

Type of Service		**Full Fares**
Cash Fare	Express	$1.75
	Local	$1.25
Passes and Tokens	10-Ride Ticket Book - Express	$18.00
	Monthly Pass - Express	$51.00
	10-Ride Ticket Book - Local	$12.00
	All Day Pass - Local	$3.60
	Monthly Pass -Local	$34.00
	Semester Pass -Local	$120.00
	Tokens (20)	$12.00

Note: Discounted fares are available to senior citizens (age 65 or older), persons with disabilities and Medicare card holders, and youth age 6 through 18. Children under age 6 accompanied by a responsible fare paying adult are not charged a fare on local or express bus service.

Source: Regional Public Transportation Authority (2003a).

In addition, several shuttle and circulator transit services have been implemented across the region with different operating schedules, including: Free Local Area Shuttle (FLASH) serving the Arizona State University campus area; FLASH Lite on Mill serving the Tempe Town Lake, Downtown Tempe, Arizona State University, and Papago areas (this service was discontinued in February 2002); Neighborhood FLASH connecting downtown Tempe and ASU with surrounding neighborhoods; Downtown Area Shuttle (DASH) serving the Downtown Phoenix-Copper Square area; Ahwatukee Local Explorer (Alex) serving Ahwatukee and west Chandler areas; Glendale Urban Shuttle (GUS) providing transit in the Glendale Central Corridor; and Scottsdale Roundup which provides transit services in Old Downtown Scottsdale. In FY 2001-2002, shuttle and circulator transit service provided a total of 1,761,059 boardings, with 1,060,183 revenue miles and 101,266 revenue hours.

Recent Transit Improvements

The Annual Transit Performance Report provides a listing of transit accomplishments for FY2002/FY2003. Several major service improvements made during the most recent fiscal year are highlighted below (RPTA, 2003b):

- The Cities of Avondale, Tolleson, Goodyear, and Litchfield Park replaced three 30-foot buses on Route 131 (START).

- The City of Chandler constructed bus pull-outs at ten locations and designed the transit station at Chandler Mall.

- In the City of Glendale, 66 percent of voters approved a one-half cent sales tax for transportation in November 2001; in July 2002, fixed route service was expanded to 10 PM Monday through Saturday with half-hour frequency and hourly service on Sundays and Holidays.

- The City of Phoenix introduced neighborhood circulator service in the Ahwatukee/Desert Foothills area; improved DASH (Downtown Area Shuttle) by introducing weekend service and extending weekday service to the State Capitol throughout the day.

- The City of Phoenix extended weekday service hours to approximately 12:00 AM on twelve local bus routes in Phoenix. These routes included the Red Line, Blue Line, Green Line, Route 0 (Central), Route 3 (Van Buren), Route 16 (16th Street), Route 19 (19th Avenue), Route 24 (24th Street/Glendale), Route 35 (35th Avenue), Route 50 (Camelback), Route 61 (Southern), and Route 106 (Peoria/Shea).

- The City of Phoenix extended Saturday service hours to approximately 10:00 PM on most local bus routes in Phoenix.

- The City of Phoenix extended bus routes to serve new areas in Phoenix including:
  - Route 3 (Van Buren) was extended from 51st Avenue to 67th Avenue;
  - Route 10 (Roosevelt) and Route 28 (Grant) were combined into one route and extended from 22nd Avenue and Lower Buckeye Road to the Durango Complex;
  - Route 13 (Buckeye) was extended from 67th Avenue to 75th Avenue;
  - Route 19 (19th Avenue) was extended to Deer Valley Airport and to Baseline Road;
  - Route 45 (Broadway) was extended to 19th Avenue;
  - Route 56 (Priest) was extended on 48th Street to Frye Road;
  - Route 156 (Chandler Boulevard) was extended from the City of Chandler to Desert Foothills Parkway.

- The City of Phoenix increased weekday frequency during rush hours on six local bus routes, including: Route 16 (16th Street), Route 19 (19th Avenue), Route 24 (24th Street/Glendale), Route 45 (Broadway), Route 50 (Camelback), and Route 61 (Southern).

- The City of Phoenix increased weekday frequency all day on four local bus routes, including: Route 27 (27th Avenue), Route 77 (Baseline), Route 138 (Thunderbird), and Route 186 (Union Hills).

- The City of Phoenix increased Saturday frequency on 14 local bus routes, including: Route 10 (Roosevelt/Grant), Route 15 (15th Avenue), Route 27 (27th Avenue), Route 35 (35th Avenue), Route 44 (44th Street/Tatum), Route 52 (Roeser), Route 59 (59th Avenue), Route 60 (Bethany Home), Route 77 (Baseline), Route 80 (Northern), Route 90 (Dunlap), Route 138 (Thunderbird), Route 170 (Bell), and Route 186 (Union Hills).

- The City of Phoenix improved Sunday and Holiday service hours to approximately 9:00 PM on most local bus routes and increased Sunday and Holiday frequency on seven routes, including: Route 16 (16th Street), Route 17 (McDowell), Route 24 (24th Street/Glendale), Route 35 (35th Avenue), Route 41 (Indian School), Route 90 (Dunlap), and Route 170 (Bell).

- The City of Scottsdale implemented Saturday service to Route 106 (Peoria/Shea) and increased frequency on and restructured Route 94 (94th Street) to Route 114 (Via Linda).

- The City of Scottsdale added Sunday service to all routes in January 2002; increased frequencies (weekday and Saturdays) on Route 68 from hourly to 30 minutes; and increased weekday and Saturday frequencies on Route 76 (Miller) and Route 84 (Granite Reef).

- The City of Scottsdale expanded Route 41 (Indian School) to Granite Reef; redesigned Route 510 (Scottsdale Express) to provide more direct service to Downtown Phoenix; extended Route 170 (Bell) to serve Northsight Blvd/Raintree Dr; increased weekday frequency to 15 minutes during peak hours on Route 72 (Scottsdale/Rural) north of Loloma Station.

- The City of Scottsdale implemented Saturday service into Scottsdale on Route 41 (Indian School), and Route 170 (Bell)

- The City of Tempe opened a Transit Store in Downtown Tempe on College Avenue; implemented bus route extensions/improvements on routes 66/68 (Mill/68th Street) and Route 76 (Miller).

The MAG transportation models and the highway and transit networks described above are utilized to estimate daily vehicle travel and transit ridership in the MAG transportation modeling area. The primary input to the air quality modeling process is transportation model estimates of daily vehicle traffic and speeds on each highway link, along with the attendant link lengths and coordinate data. A detailed description of the MAG emissions models is provided in Chapter 4.

4 AIR QUALITY MODELING

The models which have been used to estimate emission factors and emissions for carbon monoxide (CO), volatile organic compounds (VOC), and PM-10 are: MOBILE6.2, for motor vehicle emission factors for CO and VOC; PART5, for particulate exhaust and fugitive dust emission factors; and M6Link, for the calculation of spatially and temporally allocated onroad mobile emissions using the emission factors from the above models and travel and speed data from the transportation model. Emission factors from the 1994 Regional PM-10 Emission Inventory for the Maricopa County Nonattainment Area (MAG, 1997) were used for the calculation of PM-10 from road construction; the methodology for this calculation is also summarized in this chapter. Nitrogen oxide (NO_x) emissions have not been estimated, because a NO_x waiver was granted by EPA in 1995 based upon modeling results that showed nitrogen oxide reductions would not contribute to attainment of the ozone standard.

For the 2003 MAG Conformity Analysis, model inputs not dependent on the TIP or Regional Transportation Plan were generally derived from the Carbon Monoxide Maintenance Plan for the Maricopa County Nonattainment Area (MAG, 2003), the Revised Rate of Progress FIP for Ozone (EPA, 1999a), and the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area, (MAG, 2000a). The modeling efforts have been kept as consistent as possible among the three pollutants modeled. Some differences in the modeling assumptions are necessary due to the different time periods modeled (e.g. different temperatures, fuel properties) and emission models used.

The USDOT guidance memo, “Use of Latest Planning Assumptions in Conformity Determinations,” dated January 18, 2001, recommends that periodic inventory updates may be used as a source for recent modeling data (USDOT, 2001). The most recent periodic inventories available are the 1999 Periodic Carbon Monoxide Emission Inventory for the Maricopa County, Arizona, Nonattainment Area (MCESD, 2001a) and the 1999 Periodic Ozone Emissions Inventory for the Maricopa County, Arizona, Nonattainment Area (MCESD, 2001b). It is important to note that the regional emission estimates for the 2003 MAG Conformity Analysis reflect the latest planning assumptions and EPA models, which may differ from those used in developing the 1999 periodic emissions inventories.

Regional emissions have been estimated for the horizon years 2006, 2015, 2016, and 2026. The conformity rule requirements for the selection of the horizon years are summarized in Chapter 1. Consultation on the general air quality modeling methodology applied in the 2003 MAG Conformity Analysis was the subject of a memorandum

distributed in August 2003. The memorandum is included as part of the consultation record in Appendix B.

CARBON MONOXIDE

For the 2003 MAG Conformity Analysis, the applicable test for carbon monoxide consists of a "Build" versus emissions budget test, as discussed in Chapter 1. The modeling maintenance demonstration in the Carbon Monoxide Maintenance Plan includes a 2006 interim budget of 699.7 metric tons per day and a 2015 maintenance budget of 662.9 metric tons per day, which represent the motor vehicle emissions budgets for carbon monoxide based on design day conditions. On September 29, 2003, EPA found the motor vehicle emissions budgets contained in the Carbon Monoxide Maintenance Plan adequate for conformity purposes, effective October 14, 2003.

The overall modeling approach used in this analysis is consistent with that used to develop the emissions budget. More specifically, regional onroad emissions were modeled using the EMME/2 (traffic), MOBILE6.2 (emission factor), and M6Link (emissions calculation) models. Temperature and various adjustment factors from the Carbon Monoxide Maintenance Plan were also used throughout the conformity analysis for consistency.

Modeling Tools

The MOBILE6.2 model was used to estimate carbon monoxide emission factors for the regional emissions analysis. Traffic data (vehicle miles of travel and speeds by link) were generated by the EMME/2-based transportation model. The M6Link model was used to calculate regional emissions using MOBILE6.2 emission factors and the traffic data. Committed control measures from the Revised 1999 Serious Area Carbon Monoxide Plan and the Carbon Monoxide Maintenance Plan were included in the conformity analysis, as appropriate. These measures are listed in Table 2-4 and detailed descriptions may be found in the Revised MAG 1999 Serious Area Carbon Monoxide Plan and Carbon Monoxide Maintenance Plan.

MOBILE6.2

MOBILE6.2 is a model developed by EPA for the purpose of estimating motor vehicle emission factors, in units of grams per mile, for specified vehicle fleet, fuel, temperature, and speed conditions. This model calculates carbon monoxide, PM-10 (excluding reentrained dust), and ozone precursor motor vehicle emission factors.

On January 18, 2002, EPA issued policy guidance on the use of MOBILE6.2 for transportation conformity, indicating that there would be a two-year grace period before MOBILE6.2 would be required for new conformity determinations (EPA, 2002a). In the January 29, 2002 *Federal Register*, EPA announced the release of MOBILE6.2, which triggered the start of a two-year grace period that ends on January 29, 2004.

The MOBILE6.2 model generates estimates of motor vehicle emission factors in units of grams of pollutant emitted per vehicle miles of travel. MOBILE6.2 uses a locally-derived motor vehicle registration distribution (by model year) of 25 years. For the 2003 MAG Conformity Analysis, 2002 vehicle registration data from the Arizona Department of Transportation which provides the effects of the local vehicle age distribution, was used as input to MOBILE6.2. MOBILE6.2 also incorporates fleet turnover to newer, cleaner vehicles over time, which counters the increase in regional emissions that could occur with growth in vehicle miles of travel. Other factors, such as fuel quality and vehicle speed, are also important.

Inspection and maintenance (I/M) program benefits were assumed in the modeling. The I/M runs reflect the provisions of the enhanced inspection program which was implemented in January 1995 and "Phased-in I/M Cutpoints" (Measure 1), implemented in January 2000. It was assumed that for the four years modeled in this analysis, the onboard diagnostic (OBD) test would be used for the model year 1996 and newer vehicles with an exemption for all vehicles of the current + 4 model years.

MOBILE6.2 runs were weighted to account for vehicles driving in the modeling area that do not participate in the I/M program. Therefore, each modeled scenario required runs with and without the I/M program benefits. For this analysis, it was assumed that 91.6 percent of eligible onroad vehicles participate in the I/M program. This fraction reflects an increase in the participation in the I/M program due to implementation of Measure 9, "Tougher Registration Enforcement". For all scenarios modeled for this analysis, the inputs for each run included oxygenated gasoline with an assumed market share of 100 percent ethanol, consistent with Measure 14, "Clean Burning Gasoline". The gasoline volatility assumed was nine pounds per square inch. The average oxygen content of the ethanol blend gasoline was 3.5 percent by weight.

The MOBILE6.2 runs that reflected the I/M program assumed vehicle waiver rates of 1.3 percent or 1.0 percent, dependent upon model year. These fractions reflected the lower waiver rates resulting from the implementation of Measure 3, "One Time I/M Waiver".

The output from the MOBILE6.2 model includes emission factors specific to hour of the day, area type, facility type, and domain temperatures. These emission factors were used by the M6Link program to estimate the motor vehicle emissions for the MAG region.

M6Link

M6Link is a series of computer programs developed to process link data files output by transportation models, in this case EMME/2. These programs calculate emissions for roadway links in the MAG transportation networks. Traffic volumes and speeds for four time periods of the day (AM peak, midday, PM peak, and nighttime) and from four vehicle classes for each link are converted into hourly volumes based upon historical data for representative links. These are used to calculate hourly emissions, using emission factors for the appropriate link type, area type, hour, etc. Emission factors are calculated by either

the PART5 (for PM-10 only) or MOBILE6.2 model. Emissions for each hour are distributed geographically in the modeling domain based on the grid in which each link is located.

Transportation models are designed to model "average weekday" traffic patterns, which do not necessarily correspond to episodic time periods for which vehicle emissions are modeled. As a result, day of the week and month of the year factors are included in the pre-processor consistent with the methodology used in the applicable air quality plans for carbon monoxide and ozone. The CO analysis reflects a Friday in December, consistent with the day used to set the CO budget.

The transportation data input to the M6Link programs consist of database formatted files that contain link-specific data and a node coordinate definitions file. The link VMT data output by the EMME/2 transportation model is reconciled with HPMS by the first module of M6Link. The factors applied to the link volumes are described in Table 2-2. M6Link also requires as input:

- An adjustment factor table containing factors used to allocate period traffic volumes into hourly traffic volumes.
- Fugitive dust emission factors for paved and unpaved roads (generated by the PART5 model).
- A matrix of emission factors for a range of hours, facility types, area types, vehicle classes, and vehicle ages (generated by the MOBILE6.2 model).
- Factors for the appropriate weighting of vehicles that do and do not participate in the inspection/maintenance program.
- The year being modeled.
- A table appropriate for condensing the 28 vehicle classes modeled by the MOBILE6.2 model to the four classes produced by the EMME/2 model (non-commercial, light duty commercial, medium duty commercial, and heavy duty commercial).
- The ratio of vehicles participating in the I/M program.

The outputs from M6Link include an hourly, gridded onroad mobile source emissions file and several summary files containing emissions and traffic data in the modeling domain. Revised MAG 1999 Serious Area CO Plan measures 25 and 41 (refer to Table 2-4) were also accounted for through adjustments to the M6Link output for 2006, 2015, 2016, and 2026.

OZONE

For the 2003 MAG Conformity Analysis, the applicable conformity test for ozone is a “Build” versus emissions budget test, as discussed in Chapter 1. The budget was established in the Revised 1998 EPA 15 Percent Rate of Progress Federal Implementation Plan (Revised ROP FIP) (EPA, 1999a). The Revised ROP FIP includes an onroad mobile source contribution of 87.1 metric tons of VOC per average summer day.

Modeling Tools

The MOBILE6.2 model was used to estimate emission factors for hydrocarbons in the form of volatile organic compounds (VOC) for the regional emissions analysis. As discussed in Chapter 1, an emission estimate for NO_x, the other principal precursor to ozone, is not required for the conformity analysis. Traffic data (vehicle miles of travel and capacities by link) were generated with the EMME/2 transportation model. The M6Link model was used to calculate regional emissions using MOBILE6.2 emission factors and the traffic data.

MOBILE6.2

The MOBILE6.2 model was executed for both the I/M program and non-I/M program vehicles. The model runs which include the I/M program incorporated an OBD test for 1996 and newer vehicles with an exemption for all vehicles of the current + 4 model years. Again, it was assumed that 91.6 percent of eligible onroad vehicles participate in the I/M program.

The MOBILE6.2 runs performed for the ozone analysis were very similar to those performed for the CO analysis, except that conditions were changed to reflect the summer of the given year rather than winter. Differences included temperature, fuel data, and the season modeled.

The output from the MOBILE6.2 model includes emission factors specific to hour of the day, area type, facility type, and domain temperatures. VOC emissions were also output by MOBILE6.2 separately depending upon source type such as exhaust running, evaporative resting, crankcase evaporative emissions, etc. These emission factors were used by the M6Link program to estimate the motor vehicle emissions for the MAG region.

M6Link

The M6Link computer program calculates emissions for the ozone modeling domain by combining the link and node data (e.g. volumes, speeds, link locations, facility type, area type) from the EMME/2 regional transportation model with the emission factors specific to facility type, hour, etc.) generated by the MOBILE6.2 model. Other inputs to M6Link include the number of grid cells to be modeled in the air quality domain, the ratios for weighting the I/M and non-I/M emission factors, and optional flags to apply control measure effects. In addition to producing a gridded motor vehicle emissions output file, M6Link produces several files containing emissions and traffic data. The VOC analysis reflects an average day in the ozone season months, consistent with the FIP analysis used to set the VOC budget. Revised MAG 1999 Serious Area CO Plan measures 25 and 41 (refer to Table 2-4) were also accounted for through adjustments to the M6Link output for 2006, 2015, 2016, and 2026.

PM-10

For the 2003 MAG Conformity Analysis, the applicable conformity tests for PM-10 are the "Build" versus emissions budget test, as discussed in Chapter 1. The modeling attainment demonstration in the Revised MAG 1999 Serious Area Particulate Plan for PM-10 includes a motor vehicle emissions budget of 59.7 metric tons per day. The motor vehicle emissions budget also includes PM-10 estimated emissions from roadway construction.

The modeling approach used in this analysis is consistent with that used to develop the emissions budget. Regional onroad emissions were modeled using the EMME/2 (traffic), MOBILE6.2 and PART5 (emission factors), and M6Link (emission calculation) models to estimate reentrained dust from travel on paved and unpaved roads, as well as vehicle exhaust emissions. In addition, fugitive dust from road construction was calculated; assumptions used in estimating PM-10 emissions from road construction are documented later in this chapter.

Modeling Tools

The PART5 model was used to estimate particulate reentrained dust and brake wear from travel on paved and unpaved roads for the regional emissions analysis. The MOBILE6.2 model was used to estimate particulate emission factors from onroad sources other than reentrained dust (exhaust, tire wear) as described below. Traffic data (vehicle miles traveled and speeds by link) were generated with the EMME/2 transportation model. The M6Link model was used to calculate regional emissions using PART5 emission factors and the traffic data. Committed measures from the Revised Serious Area PM-10 Plan were included in the conformity analysis, as appropriate. These measures are listed in Table 2-4; detailed descriptions may also be found in the Revised MAG 1999 Serious Area PM-10 Plan.

MOBILE6.2

The MOBILE6.2 model is the current EPA model for estimating exhaust particulate emissions from onroad vehicles. The model generates estimates of particulate emissions for vehicle exhaust and tire wear from onroad motor vehicles (both gasoline and diesel powered) in units of gram per vehicle mile traveled.

PART5

The PART5 model is the current EPA model for estimating fugitive dust emissions from onroad vehicles. The model generates estimates of particulate emissions for brake wear and fugitive dust from both paved and unpaved roads.

Inputs to the PART5 model are similar to (but less detailed than) those input to the MOBILE6.2 model and include vehicle speed, scenario year, silt loading, and the number of days with measurable precipitation.

M6Link

The M6Link computer program calculates emissions for the PM-10 modeling domain by combining the link and node data (e.g. volumes, speeds, link locations, facility type, area type) from the EMME/2 regional transportation model with the emission factors specific to facility type, hour, etc...) generated by the MOBILE6.2 model (in the case of exhaust PM-10 and tire wear) or the PART5 model (in the case of fugitive dust and brake wear). Other inputs to M6Link include the number of grid cells to be modeled in the air quality domain, the ratios for weighting the I/M and non-I/M emission factors, a file containing the location and number of miles of unpaved roads in the modeling domain, and optional flags to apply control measure effects. In addition to producing a gridded motor vehicle emissions output file, M6Link produces several files containing emissions and traffic data. The PM-10 analysis reflects an average annual day, consistent with the analysis performed to set the PM-10 budget.

The unpaved road file used in M6Link was adjusted to reflect implementation of Measure 40, "Reduce Particulate Emissions from Unpaved Roads and Alleys." In addition, continued paving of ten miles of unpaved roads per year through implementation of the Regional Transportation Plan (RTP) was assumed, beginning in FY 2007 (see Chapter 9 of the RTP). The impact of these continued paving efforts was applied to the M6Link output. Revised MAG 1999 Serious Area PM-10 Plan measures 26, 50, 58, 69, and 70 (refer to Table 2-4) were also accounted for through adjustments to the M6Link output for 2006, 2015, 2016, and 2026. A more detailed discussion of the emissions reduction credit assumed for measure 50 is provided in the next section.

Calculation of Emissions Reduction Credit for PM-10 Certified Street Sweepers

In the Serious Area PM-10 Plan, the emissions reduction credit taken for measure 50, "PM-10 Efficient Street Sweepers," assumes that one-half of the fleet (i.e., 48 sweepers) will be converted to PM-10 certified units by December 31, 2006. The Plan also assumes that PM-10 certified replacements will sweep the same area and frequency as the conventional sweepers they replace. Therefore, the Serious Area Plan does not take credit for PM-10 certified units that are purchased to expand the area swept or increase sweeping frequency. The 2003 MAG Conformity Analysis takes emissions reduction credit for funding additional PM-10 certified sweepers to replace conventional units, beyond the 48 assumed in the PM-10 Plan. In addition, the Conformity Analysis assumes credit for PM-10 certified units that expand the area and increase the frequency of sweeping.

In FY 2001-2003, MAG allocated $6.7 million in Congestion Mitigation and Air Quality Improvement (CMAQ) funds to purchase 52 PM-10 certified sweepers. These 52 sweepers were purchased by local jurisdictions to replace conventional sweepers, expand the area of sweeping, and increase the frequency of sweeping. For the 2003 MAG Conformity Analysis, emission reduction credit for these 52 sweepers was calculated using sweeping schedule and traffic data (i.e., lane miles swept, sweeping cycle length, and annual average daily traffic per lane mile on streets swept) provided by the local

jurisdictions that purchased the units. Emissions reduction credit for PM-10 certified sweepers to be funded in FY 2004-2026 was also quantified using data from these 52 locally-purchased units.

An additional $5.8 million in Federal funds is programmed in the FY 2004-2007 Transportation Improvement Program to purchase PM-10 certified sweepers. Based on this funding, the 2003 MAG Conformity Analysis assumes that 36 additional PM-10 certified sweepers will be purchased in FY 2004-2006. As shown in Table 4-1, the total number of PM-10 certified sweepers funded through FY 2006 is 88, which is 40 more than the PM-10 Plan assumed for 2006.

In FY 2007, the TIP provides funding for 12 additional PM-10 certified sweepers. In FY 2008-2010, the Regional Transportation Plan assumes that eight PM-10 sweepers will be funded each year to replace older conventional units, expand the area swept, and increase the frequency of sweeping. By 2010, it is anticipated that all conventional sweepers in the PM-10 nonattainment area will be replaced with PM-10 certified units. After FY 2010, the RTP assumes that five additional PM-10 certified units will be purchased each year to increase the frequency of sweeping and clean new streets in developing areas of the rapidly-growing region.

In 2015, 2016, and 2026, the 2003 MAG Conformity Analysis takes emissions reduction credit for the number of PM-10 certified sweepers that have been funded in each of the preceding fiscal years, as shown in Table 4-1. The credit for PM-10 certified street sweepers is applied to each of the "Build" scenarios in the conformity horizon years.

Calculation of PM-10 Emissions from Road Construction

PM-10 emissions from road construction were estimated based on the size (acres) and duration (months) of the road construction projects in the TIP and Regional Transportation Plan. Specifically, the number of lane miles of road constructed per year was developed using data from the TIP and RTP. Assuming that each lane is twelve feet wide, the number of lane miles of road to be constructed was converted to the number of acres constructed per year. The number of acres constructed per year was combined with an estimate of average project duration to produce an estimate of acre-months of disturbed soil. The acre-months of disturbed soil were combined with an emission factor to produce total emissions from road construction per month. The monthly estimate of total emissions was reduced by a factor of 30 to produce an average daily PM-10 emissions estimate for road construction.

The 2003 MAG Conformity Analysis used emission factors from the 1994 Regional PM-10 Emission Inventory for the Maricopa County Nonattainment Area (MAG, 1997) and control factors from the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area, Appendices, Volume Two (MAG, 2000b) to calculate PM-10 emissions from road construction. The emission and control factors were obtained from these documents, because the PART5 model does not calculate particulate

emissions from road construction. In addition, as further required in Section 93.122(d), the control measures for fugitive dust from construction listed in the Revised MAG 1999 Serious Area Particulate Plan were applied to reduce emissions to expected levels under the applicable measures. The control level for road construction assumed in the Revised MAG 1999 Serious Area Particulate Plan for 2006 is 72 percent, a fraction that represents the implementation of Measure 39, "Strengthening and Better Enforcement of Fugitive Dust Control Rules - Construction Dust". For the 2003 MAG Conformity Analysis, this control level was applied to reduce road construction emissions for 2006, 2015, 2016, and 2026.

TABLE 4-1.
PM-10 CERTIFIED STREET SWEEPERS
ASSUMED IN 2003 MAG CONFORMITY ANALYSIS

	# of PM-10 Certified Sweepers	
FY 2001-2003[1]	52	
FY 2004[2]	12	
FY 2005[2]	16	
FY 2006[2]	8	
Subtotal in 2006		88
FY 2007[2]	12	
FY 2008[3]	8	
FY 2009[3]	8	
FY 2010[3]	8	
FY 2011[3]	5	
FY 2012[3]	5	
FY 2013[3]	5	
FY 2014[3]	5	
FY 2015[3]	5	
Subtotal in 2015		149
FY 2016[3]	5	
Subtotal in 2016		154
FY 2017-2026[3]	5 per year	
Total in 2026		204

[1]Purchased with MAG Congestion Mitigation and Air Quality Improvement funds
[2]Programmed in the FY 2004-2007 Transportation Improvement Program
[3]Funded in the 2026 Regional Transportation Plan

5 TRANSPORTATION CONTROL MEASURES

This chapter provides an update of the current status of transportation control measures identified in applicable implementation plans. Requirements of the federal conformity rule relating to transportation control measures (TCMs) are presented first, followed by a review of the applicable air quality implementation plans and TCM findings for the TIP and Regional Transportation Plan. A review of the funding and current status of TCM implementation is presented. The chapter concludes with a measure-by-measure assessment of the current status of each transportation control measure.

FEDERAL CONFORMITY RULE REQUIREMENTS FOR TCMs

The federal conformity rule (40 CFR 93.113) requires that the TIP and Regional Transportation Plan "must provide for the timely implementation of TCMs in the applicable implementation plan." The federal definition for the term "transportation control measure" is provided in 40 CFR 93.101:

> "any measure that is specifically identified and committed to in the applicable implementation plan that is either one of the types listed in Section 108 of the CAA [Clean Air Act], or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Notwithstanding the first sentence of this definition, vehicle technology-based, fuel-based, and maintenance-based measures which control the emissions from vehicles under fixed traffic conditions are not TCMs for the purposes of this subpart."

In the federal conformity rule, the definition provided for the term "applicable implementation plan" is:

> "Applicable implementation plan is defined in section 302(q) of the CAA and means the portion (or portions) of the implementation plan, or most recent revision thereof, which has been approved under section 110, or promulgated under section 110(c), or promulgated or approved pursuant to regulations promulgated under section 301(d) and which implements the relevant requirements of the CAA."

Section 108(f)(1) of the Clean Air Act as amended in 1990 lists the following transportation control measures and technology-based measures:

(i) programs for improved public transit;
(ii) restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;
(iii) employer-based transportation management plans, including incentives;
(iv) trip-reduction ordinances;
(v) traffic flow improvement programs that achieve emission reductions;
(vi) fringe and transportation corridor parking facilities serving multiple occupancy vehicle programs or transit service;
(vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use;
(viii) programs for the provision of all forms of high-occupancy, shared-ride services;
(ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
(x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
(xi) programs to control extended idling of vehicles;
(xii) programs to reduce motor vehicle emissions, consistent with title II, which are caused by extreme cold start conditions;
(xiii) employer-sponsored programs to permit flexible work schedules;
(xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
(xv) programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest. For purposes of this clause, the Administrator shall also consult with the Secretary of the Interior; and
(xvi) program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

TCM Requirements For A Transportation Plan

The EPA regulations in 40 CFR 93.113(b) indicate that transportation control measure requirements for transportation plans are satisfied if two criteria are met:

"(1) The transportation plan, in describing the envisioned future transportation system, provides for the timely completion or implementation of all TCMs in the applicable implementation plan which are eligible for funding under Title 23 U.S.C. or the Federal Transit Laws, consistent with schedules included in the applicable implementation plan.

(2) Nothing in the transportation plan interferes with the implementation of any TCM in the applicable implementation plan."

TCM Requirements For A Transportation Improvement Program

Similarly, in 40 CFR Section 93.113(c), EPA specifies three TCM criteria applicable to a transportation improvement program:

"(1) An examination of the specific steps and funding source(s) needed to fully implement each TCM indicates that TCMs which are eligible for funding under title 23 U.S.C. or the Federal Transit Laws are on or ahead of the schedule established in the applicable implementation plan, or, if such TCMs are behind the schedule established in the applicable implementation plan, the MPO and DOT have determined that past obstacles to implementation of the TCMs have been identified and have been or are being overcome, and that all state and local agencies with influence over approvals or funding for TCMs are giving maximum priority to approval or funding of TCMs over other projects within their control, including projects in locations outside the nonattainment or maintenance area;

(2) If TCMs in the applicable implementation plan have previously been programmed for federal funding but the funds have not been obligated and the TCMs are behind the schedule in the implementation plan, then the TIP cannot be found to conform:

- if the funds intended for those TCMs are reallocated to projects in the TIP other than TCMs, or

- if there are no other TCMs in the TIP, if the funds are reallocated to projects in the TIP other than projects which are eligible for federal funding intended for air quality improvement projects, e.g., the Congestion Mitigation and Air Quality Improvement Program; and

(3) Nothing in the TIP may interfere with the implementation of any TCM in the applicable implementation plan."

APPLICABLE AIR QUALITY IMPLEMENTATION PLANS

Only transportation control measures from applicable implementation plans for the MAG region are required to be updated for this analysis. For the 2003 MAG Conformity Analysis, the applicable implementation plan, according to the definition provided at the start of this chapter, is the Revised 1999 MAG Serious Area Particulate Plan for PM-10. The Environmental Protection Agency took final action on January 14, 2002 to approve the Revised 1999 Serious Area Particulate Plan for PM-10. In addition, the Revised 1998 15 Percent Rate of Progress (ROP) Federal Implementation Plan (FIP) for ozone and the Moderate Area Federal Implementation Plan for PM-10 are applicable plans. However neither of these plans contained TCMs.

Although not approved and therefore not applicable by definition, previous air quality plans are included in this discussion of transportation control measures for information purposes. The commitments from the State and local governments for the Serious Area Plans are also included for informational purposes in the TCM summaries.

Applicable Implementation Plan for Carbon Monoxide

There is no applicable implementation plan for carbon monoxide that specifies TCMs for this region. However, three submitted carbon monoxide plans, described below, provide information on transportation control measures. These measures have been implemented, and any resulting creditable emissions reduction benefits have been incorporated into the traffic and emissions forecasts for the region.

The MAG 1987 Carbon Monoxide Plan, provides a comprehensive implementation schedule in Chapter Seven (pages 7-1 through 7-84) for all of the control measures of that Plan. Chapter Eight of the MAG 1987 CO Plan assessed the expected effectiveness of each measure. These chapters are located in Appendix E.

In the MAG 1993 Carbon Monoxide Plan, the control measures and implementation schedule are contained in Chapter Eight (pages 8-1 through 8-68). Chapter Nine of the MAG 1993 CO Plan presents an assessment of the expected effectiveness of each measure. These chapters are located in Appendix F. Similarly, Chapter Two of the MAG 1993 Carbon Monoxide Plan Addendum contains a description of additional measures provided under Arizona House Bill 2001 (see Appendix G). The Revised MAG 1999 Serious Area CO Plan provides a comprehensive implementation schedule for all of the control measures in Chapter Eight (pages 8-1 through 8-146). An assessment of the expected effectiveness of each measure is located in Chapter V of the Technical Support Document (TSD) of the Revised MAG 1999 Serious Area CO Plan. These chapters are contained in Appendix H.

In addition, the Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in June 2003. The Carbon Monoxide Maintenance Plan does not introduce any new TCMs, however two maintenance

measures, “Coordinate Traffic Signal Systems” and “Develop Intelligent Transportation Systems”, will be implemented through the maintenance year of 2015.

Applicable Implementation Plan for Ozone

The only applicable ozone plan is the 15 Percent Rate of Progress (ROP) Federal Implementation Plan (FIP) promulgated by EPA on May 27, 1998 for the Maricopa County nonattainment area, effective June 26, 1998. On July 6, 1999, EPA issued the Final Rule for changes to the control strategy used in developing the Revised ROP FIP (see Appendix A). However, the Revised ROP FIP did not introduce any TCMs.

Although there is no applicable implementation plan for ozone that specifies TCMs for this region, measures included in submitted plans for ozone are reviewed for informational purposes in this report. These measures have been implemented, and any resulting creditable emission reduction benefits have been incorporated into the traffic and emission forecasts for the region.

The selected control strategies in the 1978 Nonattainment Area Plan for CO and Photochemical Oxidants in the Maricopa County Urban Planning Area (BAQC, 1978) are contained in Chapter Four (pages 4-1 through 4-18) of that document. Chapter Five of that Plan addressed the expected impact of the selected control strategies. These chapters are provided in Appendix I. The 1978 Plan contained five transportation-related measures, of which only two would be considered TCMs under the EPA definition: Carpooling - Voluntary Program; and Modified Work Schedules - Voluntary Program.

TCMs from the 1987 MAG Ozone Plan for the Maricopa County Area have been documented in Appendix J. The MAG 1993 Ozone Plan and 1993 Ozone Plan Addendum contain additional TCMs that would reduce ozone related emissions, and these measures are documented in Appendices K and L.

In addition, a Serious Area Ozone State Implementation Plan for Maricopa County, submitted to EPA in December 2000 by the Arizona Department of Environmental Quality contains a list of control measures, however no new TCMs are introduced on this list.

Applicable Implementation Plan for PM-10

On January 14, 2002, the EPA took final action to approve the Revised MAG 1999 Serious Area Particulate Plan for PM-10. A measure-by-measure review of TCMs contained in the Revised MAG 1999 Serious Area PM-10 Plan is provided later in this chapter. A comprehensive implementation schedule for all of the transportation control measures is provided in Chapter Seven (pages 7-1 through 7-285) of the Revised MAG 1999 Serious Area PM-10 Plan. An assessment of the expected effectiveness of each measure is located in Chapter V of the Technical Support Document of the Revised MAG 1999 Serious Area Particulate Plan for PM-10. These chapters are contained in Appendix M.

Although not TCMs by definition, the implementation and funding levels of the measures "Reduce Particulate Emissions from Unpaved Roads and Alleys", Reduce Particulate Emissions from Unpaved Shoulders on Targeted Arterials", and "PM-10 Efficient Street Sweepers" from the FY 2004-2007 Transportation Improvement Program are described in Table 5-1. The implementation status of these measures is contained in the 2001 Milestone Report for the Maricopa County PM-10 Nonattainment Area submitted to EPA on March 28, 2002 (see Appendix P).

In addition, three submitted plans for PM-10, described below, are reviewed for information on transportation control measures. These measures have been implemented, and any resulting creditable emissions reduction benefits have been incorporated into the traffic and emission forecasts for the region.

On August 3, 1998, EPA promulgated a PM-10 Moderate Area Federal Implementation Plan (EPA, 1998b), effective September 2, 1998, but this Plan did not introduce any TCMs. The MAG 1988 Particulate Plan For PM-10, provides a comprehensive implementation schedule in Chapter Seven (pages 7-1 through 7-108) for all of the control measures of that Plan. Chapter Eight of the MAG 1988 PM-10 Plan assessed the expected effectiveness of each measure. These chapters are located in Appendix N. In the MAG 1991 Particulate Plan for PM-10 for the Maricopa County Area and 1993 Revisions, the control measures and implementation schedule are contained in Chapter Seven (see Appendix O).

TCM FINDINGS FOR THE TIP AND REGIONAL TRANSPORTATION PLAN

Based on a review of the transportation control measures contained in the applicable air quality plans, the required TCM conformity findings are made below:

> The TIP and Regional Transportation Plan provide for the timely completion or implementation of the TCMs in the applicable air quality plans, and no schedule difficulties have been identified. In addition, nothing in the TIP or RTP interferes with the implementation of any TCM in the applicable implementation plan, and priority is given to TCMs.

A measure-by-measure assessment of individual transportation control measures in the applicable and other submitted plans is provided below. Most of the TCMs in the older plans were implemented in the short term, and have been fully implemented for several years. Their completed implementation is therefore included in the base case set of implicit assumptions in the Regional Transportation Plan. The TIP provides continued funding for many such TCMs (e.g. trip reduction, transit, bikeway improvements, ridesharing, and freeway management systems), which now have been implemented to a significantly greater degree than committed originally.

In addition, the transportation plan assumes or specifically calls for TCM implementation at current or expanded levels, consistent with adopted TCM commitments. The plan specifically addresses transit service, high occupancy vehicle lanes, demand management programs, and bicycle and pedestrian facility needs. Moreover, continued reliance on alternative modes of travel is reflected in the projected levels of vehicle traffic demand used in the determination of facility needs and funding priorities.

A listing of projects in the TIP which implement transportation control measures and other measures is provided in Table 5-1. It should be noted that not all of the projects listed in the table correspond to specific implementation commitments, because additional TCM implementation over and above SIP committed levels will be taking place.

Throughout the process of preparing the 2003 MAG Conformity Analysis for the TIP and RTP, no impediments to the timely implementation of adopted TCMs have been identified. With respect to funding, the MAG region obligates approximately 90 percent of its available federal Congestion Mitigation and Air Quality (CMAQ) Improvement budget.

Based upon the comprehensive review in the Maricopa County Annual Progress Report (MCESD, 1998), no scheduling problems relating to the implementation of adopted TCMs have been identified. In addition, the information provided in Table 5-1 provides an indication that considerable resources are being allocated to TCMs and other measures that will result in significant air quality benefits.

TABLE 5-1. PROGRAMMED TRANSPORTATION PROJECTS THAT IMPLEMENT TCMS AND OTHER MEASURES

SIP CATEGORY	FY 2004 FUNDING ($ MILLIONS)	FY 2004-2007 FUNDING ($ MILLIONS)	MEASURE DESCRIPTION
Regional Public/Rapid Transit	Capital $603.0 Operating $9.9*	Capital $1,142.9 Operating $50.0*	Transit Improvements: FY 2004 includes 43 proposed capital transit projects. The entire TIP includes 136 proposed capital transit projects.
Areawide Ridesharing and Travel Reduction	1.7	6.8	Rideshare and Trip Reduction programs are funded for each year of the FY 2004 through FY 2007 TIP including: an expanded MAG Rideshare Program ($660,000), MAG Trip Reduction Program ($910,000), and the state Travel Reduction Program ($135,000).
Park and Ride Lots	9.8	42.7	Site identification, design and construction for 9 park and ride lots.
Freeway Traffic Flow Improvement	303.0	806.7	Freeway Corridor Management System projects: DOT04-236, DOT06-213, DOT06-216, DOT06-217, DOT06-218, DOT06-258, DOT07-349.
Traffic Flow Improvement	631.0	1,259.9	Traffic Signalization Improvements, Intersection Improvements, Bus Pullouts: The TIP includes 170 signal improvements, including 56 that involve multiple jurisdictions, 39 that include bus pullouts, and an additional 20 projects that incorporate bus pullouts without signal improvements.
Bicycle and Pedestrian Travel	28.8	94.7	Improvements to Encourage Bicycle and Pedestrian Travel: The TIP includes 101 bicycle and 258 pedestrian projects included within other highway and transit improvement projects. The TIP includes 67 bicycle and 24 pedestrian specific projects.
Paving of Streets, Shoulders, and Alleys	7.5	20.6	Pave Unpaved Roads, Construct Curb, Plant and Construct Windbreaks to Control Windblown Dust: The TIP includes 16 projects to pave dirt roadways and 246 projects that add curbs. The programmed funding associated with paving of unpaved roads accounts for $7.5 million in FY 2004 and $17.3 million over the period of the TIP.
PM-10 Efficient Street Sweepers	1.5	5.8	PM-10 Efficient Street Sweepers: $5.8 million is programmed in FY 2004-2007 to purchase PM-10 Efficient Street Sweepers to reduce dust on paved roads.

* This amount includes only the funding for transit operation projects listed in the FY 2004-2007 MAG Transportation Improvement Program.

MEASURE-BY-MEASURE TCM ASSESSMENT

Transportation control measure documentation used in conjunction with the conformity assessment of the TIP and Regional Transportation Plan is provided below. The numbering system used to identify control measures is consistent with the list of TCMs in Section 108 of the Clean Air Act.

As part of the ongoing process for air quality planning in the MAG region, Maricopa County annually compiles information on the implementation status of the control measures from the adopted MAG plans for carbon monoxide, ozone, and PM-10. The results of this effort are reported to and reviewed by the MAG Air Quality Technical Advisory Committee. The most recent progress report available, prepared by the Maricopa County Environmental Services Department in July 1998 as referenced above, summarizes progress for calendar year 1996 (see Appendix P).

(i) Programs for Improved Public Transit

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 3, 4, and 10
1993 Carbon Monoxide Plan*, measures 1a, 1b, and 1c
1993 Carbon Monoxide Plan Addendum*, measure I-1
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 24

1987 Ozone Plan*, measures 3, 4, and 10
1993 Ozone Plan*, measures 1a, 1b, and 1c
1993 Ozone Plan Addendum*, measure I-1

1988 PM-10 Plan, measures 18, 19, and 25
1991 PM-10 Plan with 1993 Revisions, measures 18, 19, and 25
Revised 1999 Serious Area PM-10 Plan, measure 25

* = EPA approval pending

Measure Status:

Local commitments for short- and long-range transit improvements included in the MAG 1987 CO Plan demonstrated widespread support for continued regional transit improvements coordinated through the RPTA. In the MAG 1993 CO Plan and 1993 Ozone Plan, commitments representing approximately a seven percent increase to base service levels were made by various MAG member jurisdictions. In addition,

several jurisdictions advocated park-and-ride lots to support the public transit network. The commitments from the State and local governments for the Serious Area plans include initiatives addressing mass transit alternatives. For example, a number of cities worked in a cooperative effort with MAG, RPTA, and FTA to conduct feasibility studies for high capacity transit corridors within the metropolitan area. The studies evaluated the feasibility of options such as light rail, bus ways, and commuter rail.

In September 1996, voters of Tempe approved a sales tax referendum to fund improved transit service within their municipality. In 2000, the voters in Phoenix approved the Transit 2000 Plan increasing the local sales tax by .4 percent over a period of 20 years. The Transit 2000 Plan provides for light rail rapid transit, extended hours of local bus service, increased dial-a-ride service, additional express bus service, and other transit improvements. Also, in November 2001, Glendale voters approved a half-cent sales tax for transportation improvements including increased bus service, light rail transit, and dial-a-ride.

The RPTA reported many improvements that occurred to the region's public transportation system in the Annual Transit Performance Report FY 2002/FY 2003. Several major service improvements resulting in expanded regional transit service are highlighted in Chapter 3. For example, the City of Phoenix extended weekday service, Saturday service, and improved Sunday and Holiday service hours on a number of local bus routes.

Additional funding for transit was established in 1998 by HB 2565 that provides funding to cities, towns, and counties for transit by distributing a share of the Vehicle License Tax (VLT) and certain lottery proceeds to the Local Transportation Assistance Fund II. In 2000, HB 2565 was amended by SB 1556 requiring funds to be used for transit for jurisdictions receiving more than $2,500. LTAF II can be used for planning, training, capital and operating expenses, and marketing. In FY 2001, $9.1 million was available to cities, towns, and the county in Maricopa County. The Arizona Legislature authorized LTAF II to be in effect until September 30, 2003. Due to state budget cuts, LTAF II was eliminated in FY 2002.

Impact of TIP and RTP:

The FY 2004-2007 MAG Transportation Improvement Program (TIP) contains a listing of 136 capital transit projects estimated to cost a total of $1,142.9 million. The total funding for capital transit projects programmed for FY 2004 is $603 million. Also, over the period covered in the TIP, 90 transit projects for operations are programmed at $50 million. It is concluded that implementation of the TIP will directly support transit improvements. The 20-mile minimum operating segment of the light rail transit system is scheduled for a phased opening, with the first phase between the Phoenix Central Station and the Tempe Transit Center to open by the

end of 2006. The Central Station to 19th Avenue/Montebello is scheduled to open in April 2007 and the final phase from the Tempe Transit Center to the end of line station in Mesa, is scheduled to open in August 2007. The RTP contains a range of transit facilities and services throughout the region, including: local fixed-route bus, regional bus, rural/nonfixed route transit, commuter vanpools, paratransit, light rail transit, and commuter rail. The Regional Transportation Plan includes an additional 38 miles of light rail transit to be constructed by 2026.

(ii) Restriction of Certain Roads or Lanes to, or Construction of Such Roads or Lanes for Use by, Passenger Buses or High Occupancy Vehicles

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 5, 14, 15, and 16
1993 Carbon Monoxide Plan*, measures 2a, 2b, and 2c
1993 Carbon Monoxide Plan Addendum*, measure I-17
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 56

1987 Ozone Plan*, measures 5, 14, 15, and 16
1993 Ozone Plan*, measures 2a, 2b, and 2c
1993 Ozone Plan Addendum*, measure I-20

1988 PM-10 Plan, measures 20, 29, 30, and 31
1991 PM-10 Plan with 1993 Revisions, measures 20, 29, 30, and 31
Revised 1999 Serious Area PM-10 Plan, measure 76

* = EPA approval pending

Measure Status:

The Arizona Department of Transportation, in cooperation with local jurisdictions, is responsible for the construction of the planned MAG Freeway/Expressway System. The implementation schedule for High Occupancy Vehicle (HOV) Lanes on Freeways was specified in the Commitments volume of the MAG 1987 CO Plan. The MAG 1993 CO Plan and 1993 Ozone Plan identified additional HOV programming by ADOT.

The 1993 CO Plan and the 1993 Ozone Plan both indicate that Phoenix will analyze traffic projections and bus frequency on a periodic basis to determine the feasibility of additional HOV lanes on arterials for buses and carpools. The commitments from the State and local governments for the Serious Area plans include the addition of

a measure for RPTA to promote the use of high occupancy vehicle lanes and by-pass ramps.

As of FY 2003, these measures have resulted in approximately 102 lane miles of High Occupancy Vehicle facilities on regional freeways. Currently, an additional 18 lane miles of HOV facilities are under construction on State Route 51 between Interstate-10 and Shea Boulevard. As new HOV facilities open, RPTA continues to coordinate the promotion of park-and-ride and rideshare activities.

Impact of TIP and RTP:

The FY 2004-2007 MAG Transportation Improvement Program directly contributes to the implementation of this measure by providing funds for the construction of an additional 18 lane miles of HOV lanes on State Route 51 between Interstate-10 and Shea Boulevard by 2004. In FY 2007, ADOT plans to begin construction on eight lane miles of HOV lanes on US 60 between Val Vista Drive and Power Road. The US 60 project, which includes the HOV facilities, is estimated at $56.7 million. As part of the Regional Transportation Plan, specific HOV policies and priorities have been adopted to support this measure.

(iii) Employer-Based Transportation Management Plans, Including Incentives

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 12 and 13
1993 Carbon Monoxide Plan*, measures 3a, 3b, 3c, 3d, 3e, 3f and 3g
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 38 and 52

1987 Ozone Plan*, measures 12 and 13
1993 Ozone Plan*, measures 3a, 3b, 3c, 3d, 3e, 3f and 3g

1988 PM-10 Plan, measures 27 and 28
1991 PM-10 Plan with 1993 Revisions, measure 22
Revised 1999 Serious Area PM-10 Plan, measures 56 and 73

* = EPA approval pending

Measure Status:

In the MAG 1993 CO Plan and 1993 Ozone Plan, a number of jurisdictions indicated an ongoing commitment to employer rideshare incentives including passage of ordinances and expanded training at employer sites. Several cities

indicated an ongoing commitment to mandatory employee parking fees and preferential parking for carpools and vanpools. Maricopa County and the Arizona Department of Transportation provide preferential parking for carpools and vanpools. Commitments also included the encouragement of vanpools for County and State employees. The commitments from the State and local governments for the Serious Area plans include measures supporting employer-based transportation management plans.

The Trip Reduction Program was mandated by Arizona legislation in 1988 and is administered by Maricopa County. All employers with 50 or more employees are required to participate in the Trip Reduction Program. Elements of the Trip Reduction Program including employer training and facilitation of Transportation Management Associations are conducted by the Regional Public Transportation Authority (RPTA). MAG increased the annual allocation of federal funding for the program from $250,000 in FY 1988 to $420,000 in FY 1991, and to $460,000 annually beginning in FY 1993. Then, beginning in FY 2000, an additional $200,000 was added for an expanded Regional Rideshare Program.

During the fiscal year ending June 30, 2002, the Trip Reduction Program applied to 1,209 companies with over 625,000 employees and students participating in the survey at 2,678 sites across Maricopa County. RPTA staff have played an important role in the success of the Clean Air Campaign and the Maricopa County Trip Reduction Program. As of June 2003, there are twelve Transportation Management Associations in the region. In addition, the RPTA administers the Regional Rideshare Program that provides an on-line computer matching service for instant carpool matching for the general public. The Arizona Department of Administration conducts the Travel Reduction Program to approximately 21,500 non-university state employees in Maricopa County.

Impact of TIP and RTP:

A major portion of funding for this TCM is through the FY 2004-2007 MAG Transportation Improvement Program (TIP). Annual TIP funding includes $910,000 for the Trip Reduction Program, $660,000 for the Regional Rideshare Program, and $135,000 for the state Travel Reduction Program. The amounts indicated above include only monies specified in the TIP and not funds that the programs may receive from other sources. Chapter 15 of the Regional Transportation Plan provides for continued consideration of demand management programs. A copy the Maricopa County Trip Reduction Program 2002 Annual Report Executive Summary for the period July 1, 2001-June 30,2002 and the 2003 TDM Annual Survey Executive Summary are attached in Appendix Q (WestGroup Research, 2003; MCESD, 2002).

(iv) Trip Reduction Ordinances

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 7
1993 Carbon Monoxide Plan*, measure 4
1993 Carbon Monoxide Plan Addendum*, measure I-3
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 38 and 52

1987 Ozone Plan*, measure 7
1993 Ozone Plan*, measure 4
1993 Ozone Plan Addendum*, measure I-3

1988 PM-10 Plan, measure 22
1991 PM-10 Plan with 1993 Revisions, measure 22
Revised 1999 Serious Area PM-10 Plan, measures 56 and 73

* = EPA approval pending

Measure Status:

The Maricopa County Travel Reduction Program was established by the Arizona Legislature in 1988, with the goal of reducing the number of single occupant vehicle trips by five percent annually. Originally, the program affected employers with 100 or more employees at a work site. In 1992, the program was expanded to include employers with 75 or more employees at a site. Arizona House Bill 2001, enacted in November 1993, required Maricopa County to adopt and enforce a strengthened Travel Reduction Program Ordinance by May 31, 1994. The strengthened ordinance applies to all employers with 50 or more employees at a single worksite throughout the Maricopa County area. The annual goals are increased from a five percent to a ten percent reduction in employee single occupant vehicle trips or commuter vehicle miles of travel. The ordinance contains annual goals for five years. More recently, the ordinance has been modified to provide employers with opportunities to accomplish equivalent reductions through alternative means.

The commitments from the State and local governments for the Serious Area plans include measures supporting employer-based transportation management plans. In FY 2002, the Trip Reduction Program applied to 1,209 companies with over 625,000 employees and students participating in the survey at 2,678 sites across Maricopa County.

Impact of TIP and RTP:

This TCM receives strong support through funding in the FY 2004-2007 MAG Transportation Improvement Program (TIP) for the Regional Rideshare Program, the Maricopa County Trip Reduction Program, and the state Travel Reduction Program. Combined, the programs have been allocated funds totaling $6.8 million over the period of the TIP. This total only includes monies specified in the TIP and not funds that the programs may receive from other sources. Chapter 15 of the Regional Transportation Plan provides for continued consideration of demand management programs.

(v) Traffic Flow Improvement Programs That Achieve Emission Reductions

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 17, 18, 19, 20, 21, 22, 24, 25 and 26
1993 Carbon Monoxide Plan*, measures 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j and 5k
1993 Carbon Monoxide Plan Addendum*, measures I-2, I-16, and I-18
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 25, 40, and 41
Carbon Monoxide Maintenance Plan*, "Develop Intelligent Transportation Systems" and "Coordinate Traffic Signal Systems"

1987 Ozone Plan*, measures 17, 18, 19, 20, 21, 22, 24, 25 and 26
1993 Ozone Plan*, measures 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j and 5k
1993 Ozone Plan Addendum*, measures I-2 and I-19

1988 PM-10 Plan, measures 32, 33, 34, 35, 36, 37, 38, 39, 40, and 41
1991 PM-10 Plan with 1993 Revisions, measures 33, 34, 35, 39, and 40
Revised 1999 Serious Area PM-10 Plan, measures 26, 58, and 59

* = EPA approval pending

Measure Status:

This TCM includes a number of measures that were identified in previous air quality plans including the 1987 CO and Ozone Plans and the the 1993 CO and Ozone Plans which contained measures for mitigation of freeway construction impacts; freeway surveillance; ramp metering, and signage; computerized synchronization of traffic signals; reversible lanes on arterials; one way streets; truck restrictions during peak periods; intersection improvements; on-street parking restrictions; and bus pullouts. Measures supported by a number of jurisdictions in the Serious Area plans include: the development of Intelligent Transportation Systems (ITS), the coordination

of traffic signal systems, and other intersection improvements to reduce traffic congestion. The measures are described below.

ITS Projects and Freeway Management System Improvements

A Freeway Management System (FMS) has been implemented by ADOT, the responsible agency for traffic management on MAG-area freeways. The FMS consists of electronic variable message signs, signals for metering traffic flow at ramps, closed circuit television cameras, vehicle detectors, and a telecommunication network that links all these devices to a Traffic Operations Center. Up-to-date traffic speed and congestion information is available to the public on the internet at www.azfms.com. Approximately 87 miles of the approximately 234 mile freeway system is covered by the FMS. In addition, ITS projects aimed to manage traffic better and reduce congestion.

Traffic Signal System Coordination

Effective December 31, 1988, traffic signal synchronization has been required by Arizona law for municipalities and for ADOT roadways with traffic volumes exceeding 15,000 vehicles per day. Approximately 89 percent of all traffic signals in the region are coordinated with adjacent traffic signals. This is an ongoing measure for every jurisdiction, as signal synchronization requires annual adjustments to account for varying traffic volumes and patterns. AzTech, a federally funded ITS project launched by the region in 1996, has integrated a number of local traffic management systems. Regional corridors that cover nearly 198 miles of urban arterials have been fully instrumented to facilitate seamless traffic management across jurisdictional boundaries. Significant improvements have resulted in traffic signal synchronization across jurisdictional boundaries. The AzTech project partners have established a regional traveler information system that has resulted in more efficient dissemination of accident and traffic congestion information to the public via television, radio, and internet. In 2003, Chandler, Glendale, Mesa, and Phoenix implemented projects to improve traffic signal system coordination.

Intersection Improvements

Implementation of intersection improvements have continued at major intersections as a method to reduce traffic congestion and improve traffic flow. For example, the Arizona Department of Transportation completed construction of overpass improvements on Grand Avenue (US 60) at Thomas Road/27th Avenue and at 91st Avenue/Loop 101. In addition, some jurisdictions reported other traffic control techniques such as bus pull-outs to reduce congestion at major intersections.

In addition to the above mentioned measures, the MAG Intelligent Transportation Systems Committee completed an update of the ITS Strategic Plan first developed

in 1995. Regional ITS planning efforts are currently led by MAG. The final report updated plan documents, existing and planned ITS systems, and provided a "roadmap" for addressing regional needs through future ITS implementation. The MAG Intelligent Transportation Systems Strategic Plan Update was approved by the MAG Regional Council in February, 2001.

Impact of TIP and RTP:

Implementation of this measure is strongly supported through the FY 2004-2007 MAG Transportation Improvement Program (TIP). For FY 2004, a total of $631 million for traffic flow improvements is included in the TIP. For the period covered by the TIP, a total of $1,259.9 million is programmed for these projects. In addition, the TIP includes funds totaling $303 million in FY 2004 and $806.7 million over the next four years for traffic flow improvements on freeways. Chapter 16 of the Regional Transportation Plan provides for continued consideration of transportation system management programs.

(vi) Fringe and Corridor Parking Facilities Serving Multiple Occupancy Vehicle Programs or Transit Service

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 10
1993 Carbon Monoxide Plan*, measure 6
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 53

1987 Ozone Plan*, measure 10
1993 Ozone Plan*, measure 6

1988 PM-10 Plan, measure 25
1991 PM-10 Plan with 1993 Revisions, measure 25
Revised 1999 Serious Area PM-10 Plan, measure 74

* = EPA approval pending

Measure Status:

The 1987 CO and Ozone Plans contain commitments from many jurisdictions agreeing to assist and cooperate in the location of park-and-ride lots. Similarly, in the 1993 CO and Ozone Plans, RPTA, ADOT, Maricopa County and various cities committed to promote and expand park-and-ride lots and to seek out agreements with owners of major facilities such as shopping centers and institutions for the

placement of park-and-ride lots. The commitments from the State and local governments for the Serious Area CO and PM-10 plans include measures in which the RPTA will continue to work with member jurisdictions, private entities, and employers in the development, design, and implementation of new park-and-ride facilities.

A large number of park-and-ride lots are already operational in the Maricopa County area. The Annual Transit Performance Report FY 2002/FY 2003 prepared by the RPTA (RPTA, 2003b) indicated that there are 47 park-and-ride facilities that provide 2,417 automobile spaces in Maricopa County. The RPTA works with employers and Transportation Management Associations to promote park-and-ride lots as a means to encourage ridesharing and use of public transit. Appendix R contains a list of park-and-ride facilities in the region.

In January 2001, MAG completed the MAG Park and Ride Site Selection Study to identify a regional system of park-and-ride lots to support the regional express bus system, carpooling, and vanpooling. The recommended system includes ten sites for near-term development and ten sites for long-term development. Additional recommendations address design guidelines and criteria for lot development, a management and operations plan for the lots, and programming and implementation strategies.

Impact of TIP and RTP:

The FY 2004-2007 MAG Transportation Improvement Program has programmed $42.7 million for the implementation of park-and-ride lots. In support of park-and-ride facilities, Chapter 15 of the Regional Transportation Plan provides for continued consideration of demand management activities.

(vii) Programs to Limit or Restrict Vehicle Use in Downtown Areas or Other Areas of Emission Concentrations, Particularly During Periods of Peak Use

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 23
1993 Carbon Monoxide Plan*, measures 7a and 7b

1987 Ozone Plan*, measure 23
1993 Ozone Plan*, measures 7a and 7b

1988 PM-10 Plan, measure 38

* = EPA approval pending

Measure Status:

In the 1987 CO Plan, 1988 PM-10 Plan, and MAG 1993 CO and Ozone Plans, several jurisdictions in the MAG region indicated they would agree to consider the implementation of truck restrictions during peak periods. According to the 1993 CO Plan, Phoenix presently restricts truck loading operations on downtown streets during peak hours, in accordance with City Code Article 8, Section 36-87. Phoenix will continue to enforce its existing restrictions on deliveries into the downtown area during peak hours (7:00 to 9:00 am, and 4:00 to 6:00 pm). Gilbert indicated that it currently has an ordinance in place to restrict truck deliveries by place. There are about 16 miles of city streets with truck use restrictions in cities in Maricopa County.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2004-2007 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. Chapters 15 and 16 of the Regional Transportation Plan provide for continued consideration of demand management and transportation system management programs.

(viii) Programs for the Provision of All Forms of High-Occupancy, Shared Ride Services

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 6 and 11
1993 Carbon Monoxide Plan*, measures 8a, 8b, and 8c
1993 Carbon Monoxide Plan Addendum*, measure II-9
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 39 and 51

1987 Ozone Plan*, measures 6 and 11
1993 Ozone Plan*, measures 8a, 8b, and 8c
1993 Ozone Plan Addendum*, measure II-9

1988 PM-10 Plan, measures 21 and 26
Revised 1999 Serious Area PM-10 Plan, measures 57 and 72

* = EPA approval pending

Measure Status:

The MAG 1987 CO Plan and the MAG 1993 CO and Ozone Plans contain commitments requiring the expansion of the MAG Regional Rideshare Program, Park-and-Ride Programs, and Financial Incentives Including Zero Bus Fares. A description of Park-and-Ride Programs are reviewed in Transportation Control Measure number "vi". The commitments from the State and local governments for the Revised Serious Area CO and PM-10 Plans include measures supporting preferential parking for carpools and vanpools and encouraging the use of vanpooling. A description of each measure is provided below.

Ridesharing Programs

Ridesharing programs in the Maricopa County area include the Regional Rideshare Program and Travel Reduction Program. The Regional Rideshare Program, conducted by the Regional Public Transportation Authority, maintains an on-line computer matching service that provides instant carpool matching for the general public and for employers required to participate in the Trip Reduction Program. In addition, the Regional Rideshare Program provides partial funding to conduct the Clean Air Campaign that emphasizes the need to reduce emissions through using alternative transportation modes and alternative work schedules. MAG increased the annual allocation of federal funding for the program from $250,000 in FY 1988 to $420,000 in FY 1991, and to $460,000 annually beginning in FY 1993. Then, beginning in FY 2000, an additional $200,000 was added for expansion of the Regional Rideshare Program.

RPTA has also expanded program marketing to employers as part of the existing Trip Reduction Program administered by Maricopa County. This involves organizations with 50 or more employees or students, affecting an estimated 1,209 companies and 2,678 sites (MCESD, 2002). The RPTA also provides assistance to twelve Transportation Management Associations operating in the region.

Through the Travel Reduction Program, the Arizona Department of Administration targets all non-university state employees in Maricopa County to encourage the increased use of carpools, vanpools, public transit, and alternative work schedules.

Financial Incentives Including Zero Bus Fares

The 1993 CO Plan Addendum includes a measure for a public transportation subsidy program for state employees. During 2003, the ADOA provided a 65 percent public transit subsidy to approximately 5,590 state employees who participate in the Bus Card Plus program. The Arizona Department of Administration offered 100 percent bus subsidies during the months of June, July, and August in 2003 as an incentive for employees to use alternative modes of

transportation during the Ozone Outlook Campaign. In addition, Maricopa County reported that approximately 19 employers in the Trip Reduction Program were subsidizing employee participation in vanpool programs as of June 2003.

Impact of TIP and RTP:

The FY 2004-2007 MAG Transportation Improvement Program (TIP) provides federal Congestion Mitigation and Air Quality Improvement (CMAQ) funding for implementation of the Regional Rideshare and Travel Reduction programs. The Regional Rideshare Program is programmed at $660,000 for each year in the TIP. The Travel Reduction Program receives partial funding of $135,000 annually in the TIP. In addition, the TIP includes projects to provide funding for vanpooling. Also, ridesharing is promoted by the provision of HOV lanes, implemented through the TIP. Chapter 15 of the Regional Transportation Plan provides for continued consideration of demand management programs.

(ix) Programs to Limit Portions of Road Surfaces or Certain Sections of the Metropolitan Area to the Use of Non-Motorized Vehicles or Pedestrian Use, Both as to Time and Place

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 42
1993 Carbon Monoxide Plan*, measure 9
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 47

1987 Ozone Plan*, measure 42
1993 Ozone Plan*, measure 9

1988 PM-10 Plan, measure 55
Revised 1999 Serious Area PM-10 Plan, measure 65

* = EPA approval pending

Measure Status:

The 1987 CO and Ozone Plan as well as the 1993 CO Plan indicated that pedestrian malls were being considered in the downtown plans for various cities and towns in the MAG area. Auto free zones and pedestrian malls can be used to reduce traffic congestion and air pollution on a localized basis. The successful establishment of auto free zones and pedestrian malls is dependent upon high transit accessibility, good circulation design of adjacent arterials, and parking management.

The commitments from the state and local governments for the Revised Serious Area CO and PM-10 Plans include strengthening of initiatives to encourage non-motorized travel. The municipalities of Avondale, Carefree, Fountain Hills, Gilbert, Glendale, Goodyear, Peoria, Phoenix, Scottsdale, Tempe, and Tolleson have supported this measure through: linkage of activity centers with bikeways; establishing pedestrian routes in residential areas, creating bicycle links between subdivisions and within planned corridors along canals and transmission easements.

In addition, the MAG Regional Off-Street System (ROSS) Plan was approved in February 2001. The ROSS Plan provides guidance to MAG member agencies in creating an off-street non-motorized transportation system utilizing an extensive number of canal banks, utility line easements, and flood control channels.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2004-2007 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. Chapters 13 and 15 of the Regional Transportation Plan provide for continued consideration of this measure. Also, implementation of the ROSS Plan is covered in Chapter 12 of the Regional Transportation Plan.

(x) Programs for Secure Bicycle Storage Facilities and Other Facilities Including Bicycle Lanes, for the Convenience and Protection of Bicyclists, in Both Public and Private Areas

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 27 and 28
1993 Carbon Monoxide Plan*, measures 10a and 10b
1993 Carbon Monoxide Plan Addendum*, measure II-7
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 43 and 44

1987 Ozone Plan*, measures 27 and 28
1993 Ozone Plan*, measures 10a and 10b
1993 Ozone Plan Addendum*, measure II-7

1988 PM-10 Plan, measures 42 and 43
1991 PM-10 Plan with 1993 Revisions, measures 42 and 43
Revised 1999 Serious Area PM-10 Plan, measures 61 and 62

* = EPA approval pending

Measure Status:

The general level of planning and commitment for encouraging bicycle use and providing bicycle support facilities has increased substantially over the level observed in 1987. At the regional level, MAG established a Regional Bicycle Task Force in 1990. This task force guided the development of the Regional Bicycle Plan, which was adopted as part of the MAG Long Range Regional Transportation Plan in July 1992. The *MAG Regional Bicycle Plan* was updated in 1999.

Creating a regional off-street multi-use path/trail plan was identified as an important future planning activity during the Regional Bicycle Plan Update in 1999. The Regional Off-Street System (ROSS) Plan reveals a region-wide system of off-street paths/trails for non-motorized transportation along existing rights-of-ways and easements, such as canal banks, utility line easements and flood control channels. These types of rights-of-way and easements intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS Plan is to help make bicycling and walking viable options for daily travel trips using off-street opportunities.

In the 1993 CO and Ozone Plans, a number of jurisdictions indicated a commitment to improve bicycle facilities through the construction of additional miles of bike paths, striping of bike lanes on arterial and collector streets, and installation of additional bike racks and lockers to encourage bicycle use. To further encourage safe bicycling, the Regional Bicycle Task Force oversees the update of the Regional Bikeways Map. Updated in alternating years, the map shows existing, locally-designated bicycling facilities, and is provided for free distribution. The first map was created in 1994, and updated in 1997. Several hundred thousand maps have been distributed. The map includes bicycle lanes and paths, designated bicycle routes on roadways, popular undesignated routes, and off-street transportation trails. The most recent update of the map was completed in 2003. Of the approximately 21,000 miles of roadway in the region, the map shows 815 miles of bicycle lanes, 394 miles of bicycle routes, and 330 miles of paved and unpaved transportation trails. The *MAG Regional Bicycle Plan* also encourages the development of bicycle parking and shower facilities at appropriate daily trip destinations.

In 2002, MAG coordinated a region-wide Senior Trails Day with City of Phoenix, Scottsdale, Mesa, Goodyear, Gilbert, Tempe, Glendale, and Chandler. There were many other community partners that participated including Maricopa County Parks and Recreation, The Walking Connection, Area Agency on Aging Region I, and Senior Olympics. The event attracted over 400 participants and was part of the national effort by the Centers for Disease Control and Prevention to promote walking and bicycling as a daily activity. Similar events are being planned for 2003.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include initiatives by most cities and towns in the region to support cycling facilities. Phoenix, for example, expanded its bikeway system from approximately 75 miles in 1997 to approximately 495 miles as of August 2003. Additional bikeways are being planned for Phoenix. Also Phoenix assisted Maricopa County in a pilot program to provide over 100 free purple bikes and 30 purple bike racks (Purple People Movers) for use in the downtown area. This demonstration project was not continued. Scottsdale has adopted a Bicycle/Pedestrian Transportation Plan and continues to install and maintain bike facilities at city parks, and encourages private developers and businesses to include bike racks, lockers, and showers at work sites and other facilities. In 1997, Tempe was recognized as a "Bicycle Friendly Community" by the League of American Bicyclists and received a Silver Spoke award from the Governor's Task Force on Bicycles for outstanding contributions to bicycle facilities planning and engineering.

Impact of TIP and RTP:

The implementation of the FY 2004-2007 MAG Transportation Improvement Program will directly support the goal of increased bicycle use. There are 67 bicycle specific projects programmed for the TIP. Funding for bicycle projects totals $23.8 million in FY 2004 and $79.6 million over the period of the TIP. Specific projects to be funded each year are recommended to the MAG Management Committee by the MAG Regional Bicycle Task Force, for approval by the MAG Regional Council.

The provision of new bicycle lanes or facilities is often included as part of various road improvement projects, rather than being implemented and programmed separately. In the TIP, bicycle facility additions have been programmed as part of approximately 111 road improvements in a number of jurisdictions. Chapter 12 of the Regional Transportation Plan provides an overview of bicycle transportation and the continued development of bicycle facilities.

(xi) Programs to Control Extended Idling of Vehicles

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 41
1993 Carbon Monoxide Plan*, measure 11
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 33

1987 Ozone Plan*, measure 41
1993 Ozone Plan*, measure 11

1988 PM-10 Plan, measure 54
1991 PM-10 Plan with 1993 Revisions, measure 54
Revised 1999 Serious Area PM-10 Plan, measure 34

* = EPA approval pending

Measure Status:

In the MAG 1993 CO Plan, Carefree and Tolleson indicated that they would take steps to address emissions from idling at drive-up window facilities. Information provided to MAG by Sierra Research, a leading consultant in the field of vehicular emissions, indicates that vehicles with catalytic converters may produce more emissions during engine start-up than engine idling for brief periods. The Sierra Research report concluded that banning the use of drive-up window facilities would not significantly increase or decrease emissions of CO or oxides of nitrogen (NO_x), and would potentially increase emissions of volatile organic compounds (VOC). It is important to note that the report was completed in 1991, based upon emission data from vehicles in Southern California.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include an initiative by RPTA to follow guidelines developed by that agency in June 1996 to reduce idling of engines. The guideline specifies that, for temperatures below 90 degrees Fahrenheit and over three minutes layover, the operator should turn the engine off. If the vehicle is located within 100 yards of any residence, for temperatures below 90 degrees Fahrenheit, the engine is to be turned off regardless of layover time. Further, RPTA will continue to work with member jurisdictions to promote environmentally sensitive transit operations practices and policies.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2004-2007 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. In addition, the Regional Transportation Plan will not affect this measure.

(xii) Programs to Reduce Motor Vehicle Emissions, Consistent with Title II, Which Are Caused by Extreme Cold Start Conditions

This measure is not applicable in the MAG region.

(xiii) Employer-Sponsored Programs to Permit Flexible Work Schedules

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 35 and 36
1993 Carbon Monoxide Plan*, measures 13a, 13b, 13c, and 13d
1993 Carbon Monoxide Plan Addendum*, measure I-12
Revised 1999 Serious Area Carbon Monoxide Plan*, measure 45

1978 Ozone Plan, measure "Modified Work Schedules"
1987 Ozone Plan*, measures 35 and 36
1993 Ozone Plan*, measures 13a, 13b, 13c, and 13d

1988 PM-10 Plan, measures 48 and 49
1991 PM-10 Plan with 1993 Revisions, measure 48
Revised 1999 Serious Area PM-10 Plan, measure 63

* = EPA approval pending

Measure Status:

The 1978 Ozone Plan indicated that modified work schedules were to be implemented on a voluntary basis with emphasis on the winter period of maximum temperature inversions. The effect of this measure in reducing ozone was not calculated in the 1978 Ozone Plan.

In the 1987 CO and Ozone Plans, a number of jurisdictions supported the use of alternative work hours and work weeks for their employees. Since 1987, this measure has been implemented on a formal basis as mandated by Arizona legislation. SB 1360 established requirements for the use of adjusted work hours by at least 85 percent of State employees with offices located in a nonattainment area. Beginning in 1987, this requirement became applicable for the period between October 1 and March 31 of each year. Beginning in 1989, the requirement was also applied to county employees and to the employees of cities and towns which have a population of 50,000 or more. The 1987 legislation also required businesses with 500 or more employees at one site within a nonattainment area to prepare an adjusted work hour proposal for submittal to ADEQ by October 1 of each year.

In the MAG 1993 CO Plan and 1993 Ozone Plan, numerous MAG member agencies indicated that this measure was ongoing through the use of compressed or staggered work schedules to lessen the number of commuting trips. Also, several agencies indicated that telecommuting and teleconferencing options would

be investigated and/or expanded. MAG has taken the lead and initiated a telecommuting and teleconferencing program for its member agencies, with planning for the program initiated in FY 1998.

As specified in the 1993 CO Plan Addendum, measure I-12 "Air Pollution Emergency", enacted by Arizona HB 2001 in November 1993, authorized the Governor of Arizona to declare air emergencies on days when the National Ambient Air Quality Standards are likely to be exceeded. The Governor will prohibit, restrict, or condition the employment schedules for employees of the state and its political subdivisions (includes the county and local governments) in order to reduce vehicle emissions during air pollution emergencies. The Governor has developed a plan for implementation of this measure. Under these provisions, state employees were sent home early due to elevated carbon monoxide concentrations on one occasion in late 1994.

In 1996, the Governor issued a proclamation which requires the cities, towns and county meet a 75 percent employee compliance of three options to reduce hydrocarbon emissions from mobile sources during June 1 to September 30, 1996. The options are: work schedules that avoid workday start and ending in the peak traffic hours; compressed work week schedules; travel to and from work by alternate mode including bus, carpool, vanpool, bicycle, or walking.

This measure also responds to Clean Air Act Section 108(f)(1)(B): Additional methods or strategies that will contribute to the reduction of mobile source related pollutants during periods in which any primary air quality standard will be exceeded and during episodes for which an air pollution alert, warning, or emergency has been declared.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include initiatives supporting alternative work schedules and the use of off-peak driving, ridesharing, and the use of transit. As part of the Trip Reduction Program, RPTA facilitates formal training on compressed or alternative work schedules and provides onsite assistance to individual employers on an as-needed basis.

Impact of TIP and RTP:

The FY 2004-2007 MAG Transportation Improvement Program contains funding for the Trip Reduction and Rideshare Programs in the amount of nearly $6.8 million. In addition, the TIP includes $2.7 million for the Regional Videoconferencing System program activities and the RPTA project, Telework Outreach Program. The construction of other transportation or related facilities and other provisions of transportation services that are programmed in the TIP will not affect the schedule or effectiveness of this measure. Chapter 15 of the Regional Transportation Plan

includes a description of demand management programs in support of this measure.

(xiv) Programs and Ordinances to Facilitate Non-Automobile Travel, Provision and Utilization of Mass Transit, and to Generally Reduce the Need for Single-Occupant Vehicle Travel, as Part of Transportation Planning and Development Efforts of a Locality, Including Programs and Ordinances Applicable to New Shopping Centers, Special Events, and Other Centers of Vehicle Activity

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 8, 9, 39, and 40
1993 Carbon Monoxide Plan*, measures 14a, 14b, 14c, and 14d
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 46, 50, and 54

1987 Ozone Plan*, measures 8, 9, 39, and 40
1993 Ozone Plan*, measures 14a, 14b, 14c, and 14d

1988 PM-10 Plan, measures 23, 24, 52, and 53
1991 PM-10 Plan with 1993 Revisions, measures 23 and 24
Revised 1999 Serious Area PM-10 Plan, measures 64, 68, and 75
* = EPA approval pending

Measure Status:

In the MAG 1993 CO Plan, numerous MAG member jurisdictions indicated that new developments are encouraged through their General Plan to support alternative modes of transportation. In 1995, the Maricopa Association of Governments completed an Urban Form Study which examines the transportation and air quality impacts of land use development within the region.

Arizona legislation enacted in 1987 requires every State agency, board, and commission to submit an air quality impact report to ADEQ on any State-funded transportation related project that it determines may impact air quality. In 1988, the Arizona Legislature required Maricopa County to establish a Voluntary No Drive Days Program. The Clean Air Campaign urges the public not to drive on a given day each week, as well as on alert days when severe pollution concentrations are expected. The program is in effect from October through March when atmospheric conditions may lead to increased carbon monoxide levels.

The commitments from the State and local governments for the Serious Area CO and PM-10 plans include initiatives from a number of municipalities in support of

Land Use/Development Alternatives. For example, the Avondale, Phoenix, and Scottsdale implement general land use planning and development administration to improve the quality of life, promote land use compatibility, reduce infrastructure costs, promote accessibility, and reduce traffic congestion. Promotion of air quality is an integral part of these efforts and a natural by-product. The Tempe General Plan 2020 goals which support this measure are: develop and implement a Comprehensive Multi-modal Circulation Plan, promote land development that integrates multiple modes of transportation, including transit, pedestrians, and bicycles, create ordinances, policies, or design guidelines that support the Comprehensive Multi-modal Circulation Plan, and encourage mixed-use development and promotion on non-polluting modes of travel into urban design. The Maricopa County Land Use Element of the Comprehensive Plan encourages efficient land development that is compatible with adjacent land uses, well integrated with the transportation system, and sensitive to the natural environment.

Impact of TIP and RTP:

The construction of transportation facilities and provision of transportation services as programmed in the FY 2004-2007 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure.

(xv) Programs for New Construction and Major Reconstruction of Paths, Tracks or Areas Solely for Use by Pedestrian or Other Non-motorized Means of Transportation When Economically Feasible and in the Public Interest

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 29 and 30
1993 Carbon Monoxide Plan*, measures 15a and 15b
1993 Carbon Monoxide Plan Addendum*, measure II-7
Revised 1999 Serious Area Carbon Monoxide Plan*, measures 43 and 44

1987 Ozone Plan, measures 29 and 30
1993 Ozone Plan*, measures 15a and 15b
1993 Ozone Plan Addendum*, measure II-7

1988 PM-10 Plan, measures 44 and 45
1991 PM-10 Plan with 1993 Revisions, measures 44 and 45
Revised 1999 Serious Area PM-10 Plan, measures 61 and 62

* = EPA approval pending

Measure Status:

In the 1987 CO and Ozone Plans and the 1993 CO Plan, a number of jurisdictions indicated that encouragement of pedestrian travel is an ongoing measure. In November 1993, House Bill 2001 authorized ADOT to make grants from its portion of the State Air Quality Fund for intermodal transportation, pedestrian, and bicycle projects and activities.

MAG is a leader in promoting improvement in the Region's streetside environments to better accommodate and encourage pedestrian travel. Past pedestrian planning efforts conducted by MAG and its member agencies have led to a variety of pedestrian-oriented policies, programs and roadway improvements. The Pedestrian Working Group was created in 1994 to address pedestrian issues on a regionwide basis and includes members from cities and towns, the county, and the landscape architecture community. The Working Group updates the pedestrian plan and helps develop activities to educate the region about the benefits of walking. Part of this educational effort includes sponsoring an annual conference series, Walking and Bicycling In the 21st Century. In 1995, MAG developed its Pedestrian Policies and Design Guidelines to set a regional standard for pedestrians throughout the region. These guidelines are contained in a comprehensive manual of pedestrian policies and facility design that can be used by community groups, planners and design professionals. Funding for updating the Guidelines is budgeted for FY 2004. To implement the guidelines, MAG initiated a Design Assistance program in 1996 to encourage construction of pedestrian facilities. In addition, the Pedestrian Plan 2000 outlines programs and actions to promote better pedestrian accommodation in the regional transportation system.

The following items are among the actions that have been undertaken through MAG regional plans and programs to implement the Pedestrian and Bicycle Goals:

- Leverage funding for the construction of pedestrian facilities through the Pedestrian Design Assistance Program. An investment of $701,000 in 17 projects has leveraged nearly $5 million in federal transportation funds for pedestrian areas, which does not include substantial local or private funds used to construct the designs. An additional $200,000 in design assistance has been budgeted for FY 2004.

- Sponsor the Walking in the 21st Century Conference Series, attended by planners, engineers, design professionals, and pedestrian advocates statewide. These periodic seminars, held approximately every 18 months, increase awareness about pedestrian facility design and the benefits of walking.

- Since 1992, provided over $18.7 million in Transportation Enhancement funding to Avondale, Cave Creek, Chandler, El Mirage, Gilbert, Glendale, Guadalupe, Mesa,

Maricopa County, Peoria, Phoenix, Scottsdale, Tempe and Wickenburg to develop multi-use paths, pedestrian projects, and enhance alternative transportation modes.

The commitments from the state and local governments for the Serious Area CO and PM-10 plans include initiatives by most cities and towns in the region to support cycling facilities. Phoenix, for example, expanded its bikeway system from approximately 75 miles in 1997 to approximately 495 miles as of August 2003. Additional bikeways are being planned for Phoenix. Phoenix has also assisted the County in a pilot program to provide free bikes (Purple People Movers) for use in the downtown area. Over 100 purple bikes and 30 purple bike racks were made available. After implementation of this demonstration project, the City moved to end this Program. Scottsdale has adopted a Bicycle/Pedestrian Transportation Plan. Scottsdale continues to install and maintain bike facilities at City parks, and encourages private developers and businesses to include bike racks, lockers, and showers at work sites and other facilities. Tempe facilitates and promotes bicycle travel through a variety of programs. More than 150 miles of bikeways currently exist in Tempe with more than half of all collector and arterial streets having a dedicated bicycle facility. In 1997, Tempe was recognized as a "Bicycle Friendly Community" by the League of American Bicyclists" and received a Silver Spoke award from the Governor's Task Force on Bicycles for outstanding contributions to bicycle facilities planning and engineering. In Tempe, bicycle racks are installed with new development. Mesa and Chandler have also developed bicycle plans.

In addition, as part of "Growing Smarter" legislation, cities and towns in the MAG region will each be updating or creating a bicycle element in their General Plans. As MAG reviews these general plans, comments are given to jurisdictions to address the General Plan's conformance with adopted bicycle and pedestrian plans and policies. The goals of the MAG Pedestrian Plan 2000, Regional Bicycle Plan and ROSS Plan encourage local jurisdictions to establish a bicycle and/or pedestrian coordinator position to ensure bicycling and pedestrian needs are integrated into all transportation projects and other local planning efforts.

Impact of TIP and RTP:

The provision of new sidewalks (and supporting amenities such as lighting and landscaping) is often included as part of various road improvement projects, rather than being implemented and programmed separately. It should also be noted that sidewalk provision is often required of the private sector as a condition for property development. The FY 2004-2007 MAG Transportation Improvement Program contains 24 specific pedestrian projects and 258 other transportation projects that include provisions for pedestrian travel. Funding for pedestrian projects totals nearly $5 million in FY 2004 and $15 million over the period of the TIP. Chapter 13 of the Regional Transportation Plan provides an overview on pedestrian travel in support of these measures.

(xvi) Program to Encourage Voluntary Removal from Use and the Marketplace of Pre-1980 Model Year Light Duty Vehicles and Pre-1980 Model Light Duty Trucks

Submitted Plans and Measures:

Revised 1999 Serious Area Carbon Monoxide Plan*, measures 8 and 22
Revised 1999 Serious Area PM-10 Plan, measures 8 and 23

*= EPA approval pending

Measure Status:

This Transportation Control Measure is a committed measure in the Serious Area CO and PM-10 Plans. This measure includes the Voluntary Vehicle Repair and Retrofit Program and the Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program as described below.

Voluntary Vehicle Repair and Retrofit Program

According to the Arizona Revised Statutes 49-474.03, Maricopa County is required to operate and administer a Voluntary Vehicle Repair and Retrofit Program. Beginning in January 1999, the program is designed to provide for real and quantifiable emissions reductions based on actual emissions testing performed on the vehicle before repair or retrofit. The County is also required to coordinate the program with the Arizona Department of Environmental Quality and Arizona Department of Transportation.

A vehicle owner may participate in the program if all of the following criteria are met:

- The owner is willing to participate in the program.
- The vehicle is functionally operational.
- The vehicle is titled in this state, has taken the emissions inspection test, has been registered during the immediately preceding twelve months and has not been unregistered for more than sixty days.
- The vehicle is at least twelve years older than the current calendar year.
- The vehicle is required to take the emissions inspection test and the vehicle fails the emissions test in the emissions inspection results portion of the test. The vehicle owner is required to apply to the program not more that sixty days after failing the test.
- The emissions control system has not been tampered with.
- The emissions control system has not been removed or disabled, in whole or in part.

- The vehicle is taken to a participating repair facility. Any repairs performed at an unauthorized repair facility are not eligible for payment.
- Participation in the program is limited to one vehicle per owner.
- Motor homes, motorcycles, salvage vehicles and fleet vehicles are not eligible to participate in the program.

In addition, the Voluntary Vehicle Repair and Retrofit Program provides that:

- Vehicle owners who qualify for the repair and retrofit program pay the first $150 as a copayment.
- Vehicles that require more than $700 in repair costs are not eligible unless the vehicle owner chooses to pay additional costs.
- A vehicle that is able to accept a retrofit kit is required to have the retrofit kit installed. A vehicle that requires more than $800 in aggregated retrofit parts and labor costs is not eligible for the program unless the vehicle owner pays the additional costs.

From January 1999 through September 2003, a total of 4,907 vehicles have been repaired through the Maricopa County Voluntary Vehicle Repair and Retrofit Program. Approximately 155 of those vehicles had retrofit kits installed. According to Maricopa County, the program is very cost effective. The cost to the County is $807 per metric ton, annualized over two years. Collectively, the County estimates that the Voluntary Vehicle Repair and Retrofit Program results in a total reduction of 1,110.10 metric tons per year of carbon monoxide, 56.36 metric tons per year of hydrocarbons, and 65.10 metric tons per year of nitrogen oxides.

Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program

This measure was also included as part of an initiative entitled “Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program”. Maricopa County indicates that the implementation of this measure involves a program to purchase and retire vehicles that produce excessive emissions, particularly pre-1980 model year light duty automobiles and trucks. Maricopa County revised its Trip Reduction Ordinance to include flexibility provisions, also called Equivalent Emission Reduction Credit, authorized under A.R.S. Section 49-588 which includes voluntary vehicle trade-outs. This revision will allow trade-outs completed after October 16, 1996 to be used to achieve the emission reduction goals established under the ordinance.

Impact of TIP and RTP:

The transportation projects in the FY 2004-2007 MAG Transportation Improvement Program and Regional Transportation Plan are not anticipated to impact the schedule or effectiveness of this measure.

6 TIP AND RTP CONFORMITY

The principal requirements of the federal transportation conformity rule for TIP and Regional Transportation Plan assessments are: (1) the TIP and RTP must pass an emissions budget test with a budget that has been found to be adequate by EPA for transportation conformity purposes, or an emissions reduction test; (2) the latest planning assumptions and emission models specified for use in air quality implementation plans must be employed; (3) the TIP and RTP must provide for the timely implementation of transportation control measures (TCMs) specified in the applicable air quality implementation plans; and (4) consultation. Consultation generally occurs both at the beginning of the process of preparing the conformity analysis, on the proposed models, associated methods, and assumptions for the upcoming analysis and the projects to be assessed, and at the end of the process, on the draft conformity analysis report. The final determination of conformity for the TIP and Regional Transportation Plan is the responsibility of the Federal Highway Administration and the Federal Transit Administration.

The previous chapters and the appendices present the documentation for all of the requirements listed above for conformity determinations except for the conformity test results. Prior chapters have also addressed the updated documentation required under the federal transportation conformity rule for the latest planning assumptions and the implementation of transportation control measures specified in the applicable air quality implementation plans. Interagency consultation on the 2003 MAG Conformity Analysis for the TIP and Regional Transportation Plan is documented in Appendix B. Appendix S includes the public hearing process documentation. The response to comments received as part of the public comment process are included in Appendix T.

This chapter presents the results of the conformity tests, satisfying the remaining requirement of the federal transportation conformity rule. Separate tests were conducted for carbon monoxide (CO), volatile organic compounds (VOC), and particulate matter under ten microns in diameter (PM-10). For each test, the required emissions estimates were developed using the transportation and emission modeling approaches required under the federal transportation conformity rule and summarized in Chapters 3 and 4. The applicable conformity tests were reviewed in Chapter 1. The results are summarized below, followed by a more detailed discussion of the findings for each pollutant. Table 6-1 and Figures 6-1 through 6-3 present results for CO, VOC, and PM-10, respectively, in metric tons per day for each of the horizon years tested.

For carbon monoxide, the applicable conformity test is the emissions budget test, using the interim and maintenance budgets established in the Carbon Monoxide Redesignation Request and Maintenance Plan. Both carbon monoxide budgets were found by EPA to be adequate for conformity purposes, effective October 14, 2003. The modeling results indicated that the CO emissions predicted for the "Build" scenario for 2006 is less than the 2006 interim emissions budget, and the CO emissions predicted for each of the "Build" scenarios for 2015, 2016, and 2026 are less than the 2015 maintenance emissions budget. The TIP and Regional Transportation Plan therefore satisfy the conformity emissions test for carbon monoxide.

For volatile organic compounds, the applicable conformity test is the emissions budget test, using the Revised 1998 15 Percent Rate of Progress (ROP) Federal Implementation Plan (FIP) budget established for an average summer (ozone) season day. The modeling results for all analysis years indicate that the VOC emissions predicted for each of the "Build" scenarios are less than the Revised ROP FIP budget. The TIP and Regional Transportation Plan therefore satisfy the conformity emissions test for volatile organic compounds.

For PM-10, the applicable conformity test is the emissions budget test, using the Revised MAG 1999 Serious Area Particulate Plan for PM-10 budget. The modeling results for all analysis years indicate that the PM-10 emissions predicted for the "Build" scenarios are less than the emissions budget. The TIP and Regional Transportation Plan therefore satisfy the conformity emissions tests for PM-10.

As all requirements of the federal conformity rule have been satisfied, a finding of conformity for the FY 2004-2007 MAG Transportation Improvement Program and MAG Regional Transportation Plan is supported.

CONFORMITY TEST RESULTS FOR CARBON MONOXIDE

The conformity modeling results for carbon monoxide are presented in Table 6-1 and Figure 6-1. Emissions were calculated for the modeling domain for a 24-hour period based on design day conditions. The projected "Build" scenario CO emissions for 2006 are 672.9 metric tons per day, less than the interim 2006 budget of 699.7 metric tons per day. The projected "Build" scenario CO emissions for 2015, 2016, and 2026 are 606.8, 603.6, and 617.1 metric tons per day, respectively, less than the maintenance budget of 662.9 metric tons per day.

Since the projected carbon monoxide emissions for the TIP and Regional Transportation Plan are less than the budget, the results support a finding of conformity.

CONFORMITY TEST RESULTS FOR OZONE

The conformity modeling results for ozone are presented in Table 6-1 for the budget specified in the Revised Rate of Progress Federal Implementation Plan, and are graphed in Figure 6-2. The volatile organic compounds emissions were calculated for the modeling domain for an average summer day. The projected "Build" scenario VOC emissions for 2006, 2015, 2016, and 2026 are 70.8, 44.3, 43.9, and 38.3 metric tons per day, respectively, which are all less than the budget of 87.1 metric tons per day.

Since the projected volatile organic compounds emissions for the TIP and Regional Transportation Plan are less than the budget, the results support a finding of conformity.

CONFORMITY TEST RESULTS FOR PARTICULATE MATTER

The conformity modeling results for PM-10 are listed in Table 6-1 and graphed in Figure 6-3. The PM-10 emissions were calculated for the modeling domain for an average annual day. The projected "Build" scenario PM-10 emissions for 2006, 2015, 2016, and 2026 are 53.9, 53.2, 53.4, and 56.9 metric tons per day, respectively, which are all less than the budget of 59.7 metric tons per day established in the Revised MAG 1999 Serious Area Particulate Plan for PM-10.

Since the projected PM-10 emissions for the TIP and Regional Transportation Plan satisfy the applicable conformity tests, the results support a finding of conformity.

TABLE 6-1. CONFORMITY TEST RESULTS FOR CO, VOC, AND PM-10 (METRIC TONS/DAY)

Year and Scenario	2006 Carbon Monoxide[a]	2015 Carbon Monoxide[a]	1999 Volatile Organic Compounds[b] (Revised ROP FIP)	PM-10[c]		
				Onroad Mobile	Construction	2006 Total PM-10
Budget	*699.7*	*662.9*	*87.1*	*N/A*	*N/A*	*59.7*
2006 — Build	672.9		70.8	53.6	0.3	53.9
2015 — Build		606.8	44.3	52.9	0.3	53.2
2016 — Build		603.6	43.9	53.1	0.3	53.4
2026 — Build		617.1	38.3	56.6	0.3	56.9

a The Carbon Monoxide Maintenance Plan established an interim 2006 interim budget and a 2015 maintenance budget. The motor vehicle–related 24-hour emissions correspond to December 16, 1994 design day conditions.

b Motor vehicle–related 24-hour emissions based on average summer (ozone) season traffic.

c Motor vehicle–related 24-hour emissions corresponding to average annual day.

Figure 6-1: Carbon Monoxide Results for Conformity Budget Test

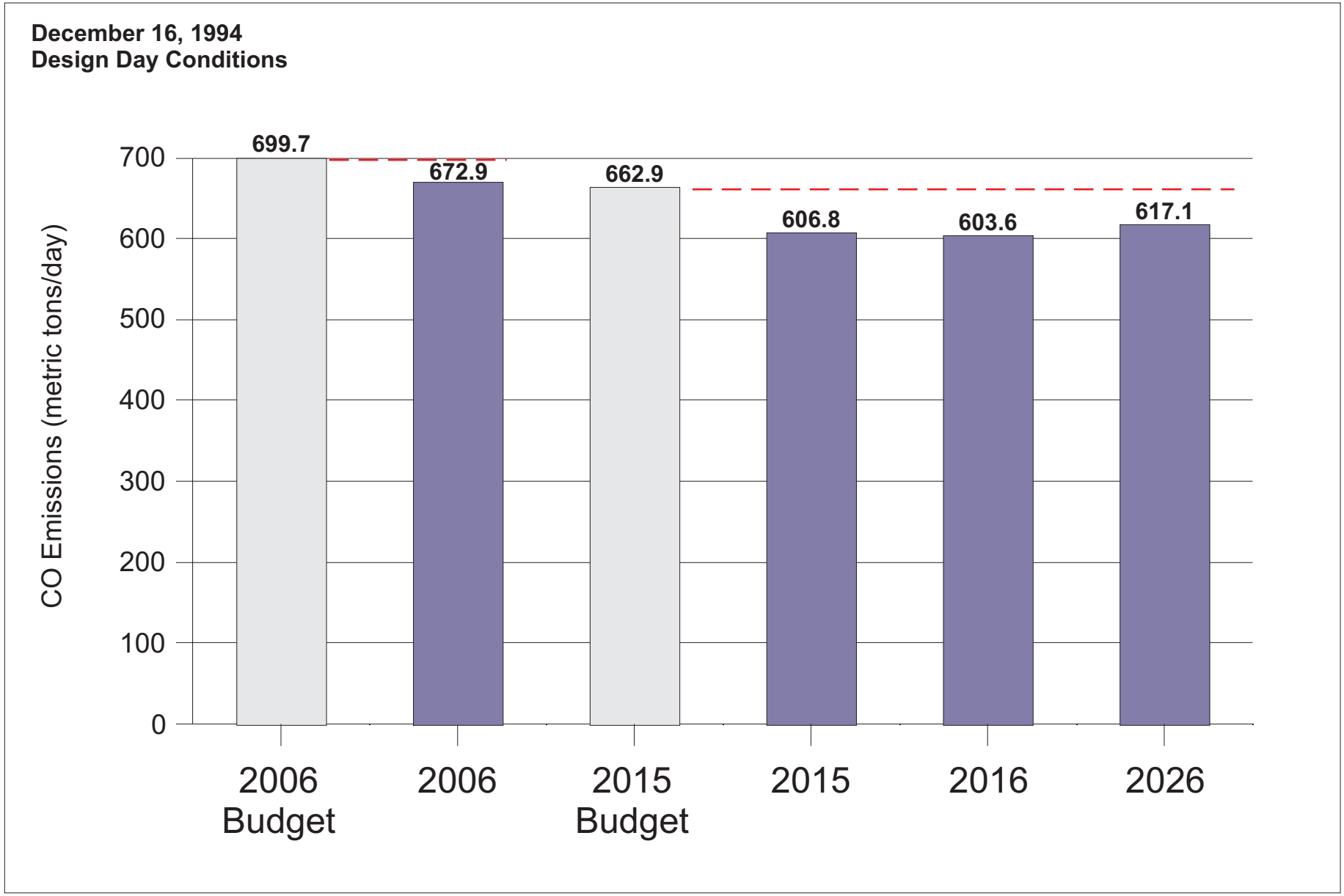


Figure 6-2: Volatile Organic Compounds (VOC) Results for Conformity Budget Test

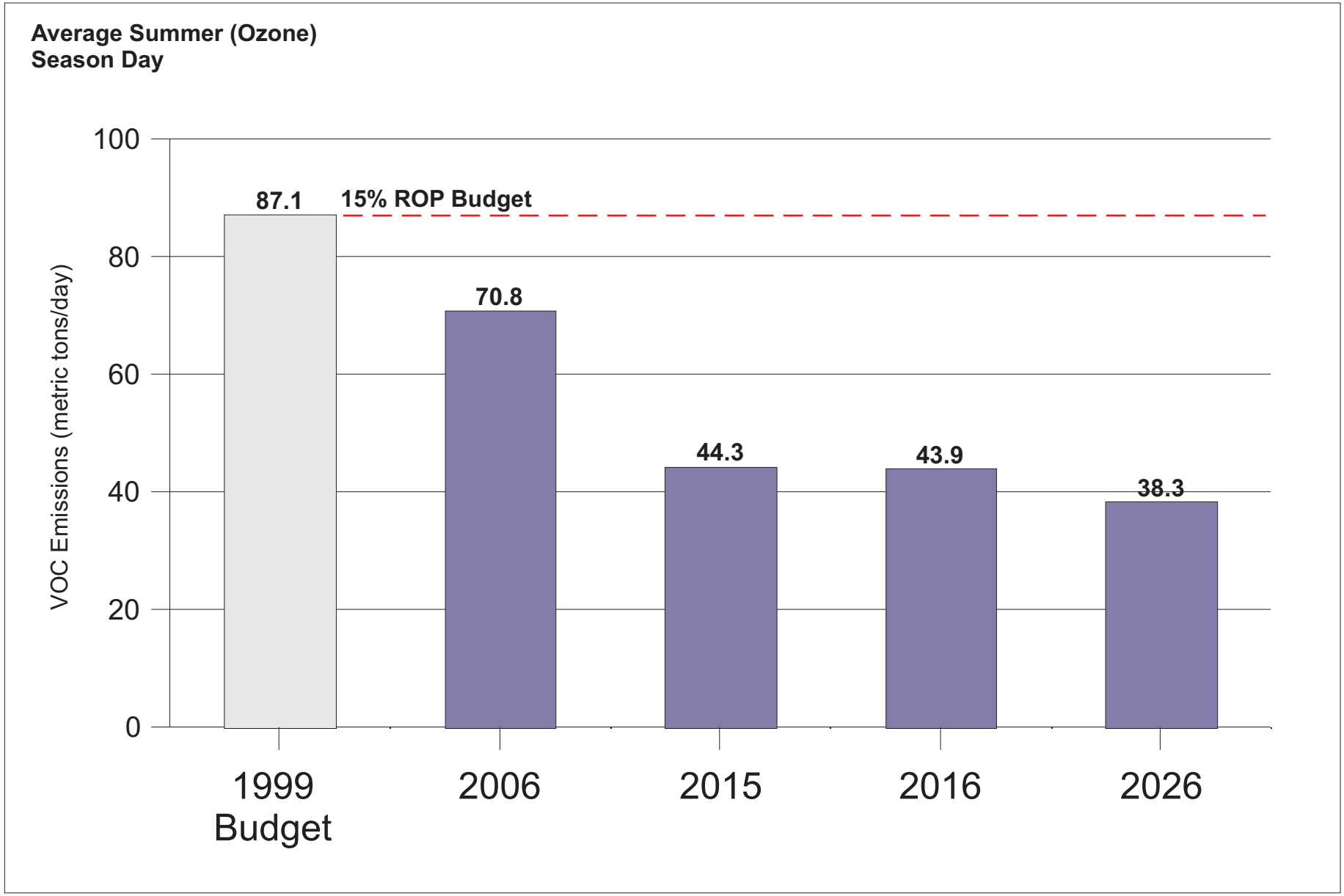
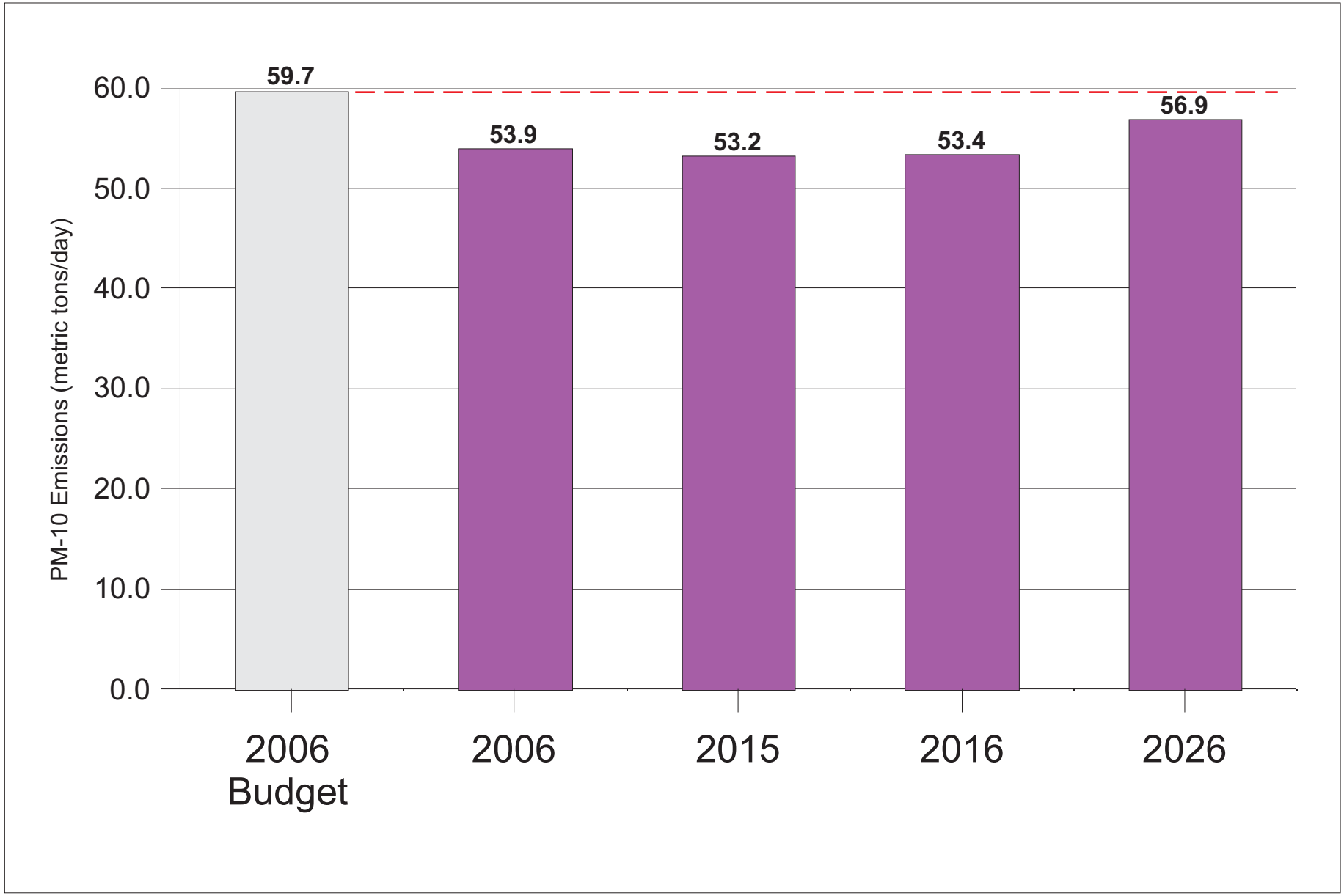


Figure 6-3: PM-10 Results for Conformity Budget Test



GLOSSARY

40 CFR Parts 51 and 93	Sections 51 and 93 from Title 40 of the Code of Federal Regulations describing the transportation conformity rule.
ADEQ	Arizona Department of Environmental Quality.
ADOT	Arizona Department of Transportation.
Applicable Plan	The most recent air quality plan that has been approved by EPA for a specific air pollutant.
A.R.S.	Arizona Revised Statutes. The codified laws of the State of Arizona.
Arterial Roadway	A major urban street serving through traffic and also providing access to adjacent land.
Attainment	The status of having air quality that is below (i.e., cleaner air) the allowable national standard for a particular pollutant.
Build/No-Build	"Build" refers to the action scenario which assumes the "No-Build" scenario and the implementation of the proposed action (included in the TIP or RTP) for each of the years to be analyzed. "No-Build" refers to the baseline scenario which assumes the future transportation network without implementation of the proposed action (included in the TIP or RTP) for the years to be analyzed.
CAA	The U.S. Clean Air Act, referring to the Air Pollution Control Act of 1955, as subsequently amended in 1963, 1967, 1970, 1974, 1977, and 1990.
Capacity	The maximum number of vehicles that a roadway can carry in a given time period under prevailing roadway, traffic, and control conditions.

Centroid Connector	An abstract representation of the local street system, as used in MAG travel demand models. These links connect the centroids of zones, where trips begin or end, to arterial or collector roadways on the modeled road network.
CMAQ	Congestion Mitigation and Air Quality Improvement Program.
CO	Carbon monoxide. A colorless, odorless, poisonous gas that results from the incomplete combustion of carbon-based fuels, such as gasoline.
Collector Roadway	A minor urban street providing access to and from local streets and serving adjacent land use.
Concentration	The relative content of a pollutant in the air, expressed as a volume unit to volume unit often expressed as an average for a specified time interval. For example, the national standard for ambient carbon monoxide concentration is an eight-hour average of 9.0 parts per million.
Conformity	An analysis which demonstrates that a transportation plan, program, or project conforms with the State Implementation Plan purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and that such activities will not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.
Congestion	Traffic congestion is a condition in which vehicles experience undue delay. It is quantified in the MAG travel demand models by the ratio of traffic volume to capacity (V/C). A V/C ratio of 1.00 or more is considered severe congestion.
Design Day	A day selected to represent conditions (meteorology, etc.) under which violations of the air quality standard for a particular pollutant are likely to occur.

DRAM/EMPAL	Disaggregate Residential Allocation Model/Employment Allocation Model. The MAG land use model used to allocate regional households and employment projections to subregional areas.
Emission Factor	The rate at which a pollutant is emitted from a given source (example: grams per mile) for given conditions (e.g., vehicle type and model year, vehicle speed, fuel type, and ambient air temperature).
EMME/2	Equilibre Multimodal, Multimodal Equilibrium, version 2. A set of computer programs which are used to run the MAG travel demand models.
EPA	United States Environmental Protection Agency.
Exceedance	A term used to refer to an episode during which ambient concentrations of an air pollutant in a region are higher than the allowable national standard.
FHWA	Federal Highway Administration.
FIP	Federal Implementation Plan.
FMS	Freeway Management System. Infrastructure such as cameras, variable message signs, and ramp metering systems to improve the flow of people and goods on limited access facilities.
FTA	Federal Transit Administration.
Freeway	A divided highway with two or more lanes for the exclusive use of traffic in each direction, and with full control of access and egress.
FY	Fiscal Year. The federal fiscal year extends from October 1 to September 30. For example, FY 2001 begins on October 1, 2000.
Hot Spot	Localized area with the potential to cause or contribute to a violation of an air quality standard. For example, a busy intersection where vehicular traffic may cause or contribute to increased emissions of carbon monoxide may attribute to a violation of the standard.

HOV	High Occupancy Vehicle. Multi-occupant vehicles such as a carpool, vanpool, or bus.
HOV Lane	A roadway lane available for use by High Occupancy Vehicles.
HPMS	Highway Performance Monitoring System. Summary information for urbanized areas provides detailed data for a sample of the arterial and collector functional systems to assess highway condition, performance, air quality trends, and future investment requirements.
I/M	Vehicle Inspection/Maintenance Program.
ITS	Intelligent Transportation System. The deployment of advanced electronics and information technologies to improve the performance of freeways and arterial roadways.
Link	A computer record describing a section of roadway in the MAG transportation models.
Local Roadway	A road, usually with low traffic volume, designed solely to serve adjacent development rather than through traffic.
M6Link	A MAG software program that combines emission factors (such as from MOBILE6) with link-level transportation data to produce onroad mobile emission inventories.
MAG	Maricopa Association of Governments. The Maricopa Association of Governments was designated the metropolitan planning agency for Maricopa County, Arizona, by Governor Jack Williams on December 14, 1973.
MCESD	Maricopa County Environmental Services Department.
Metric Ton	A unit of mass equal to 1000 kilograms, or approximately 2203 pounds.
Mode Choice Model	A computer model which determines mode choice, such as transit, auto driver, and auto passenger, based on variables such as travel times, costs, and income of travelers.

MOBILE6.2	MOBILE6 is a currently approved EPA model for estimating onroad vehicle emission factors. This model is used to estimate the emission factors for CO, TOG, and PM-10 tailpipe emissions.
MPO	Metropolitan Planning Organization. A body of elected public officials responsible for regional transportation decision-making, as required under federal transportation planning regulations.
NAAQS, or National Standard	Refers to the National Ambient Air Quality Standards (NAAQS) which are the maximum pollutant levels which may not be exceeded in the ambient air to protect the public from adverse health effects.
Network	A computer readable representation of a specific urban street and highway system.
Nonattainment Area	An area designated by the U.S. Environmental Protection Agency as not being in attainment of the national standard for a specified pollutant.
Node	A point identifying one end of a link in the MAG transportation models.
NO_x	Nitrogen Oxides includes nitric oxide (NO) and nitrogen dioxide (NO_2). These gaseous air pollutants combine with volatile organic compounds (i.e. hydrocarbons) in the presence of sunlight to produce ozone.
O_3	Ozone is a secondary pollutant formed by the combination of VOCs and NO_x in the presence of sunlight.
OBD	On-Board Diagnostics. A computer based system built into all model year 1996 and newer light-duty cars and trucks. OBD monitors the performance of some of the engines' major components, including individual emission controls.
PART5	PART5 is a currently approved EPA model for estimating onroad vehicle emission factors. This model is used to estimate PM-10 emission factors from vehicle exhaust, brake and tire wear, and re-entrained dust from travel on paved and unpaved roads.

Phased in I/M Cutpoints	Cutpoints are the maximum emission level, by pollutant, used to determine if a vehicle passes or fails the emissions test administered through the vehicle inspection and maintenance program. The phased-in I/M cutpoints are the cutpoints currently enacted into legislation for vehicles subject to the enhanced emissions test.
PM-10	Particulate Matter with diameter of 10 microns or less.
ppm	Parts per million, a measure of pollution concentration.
psi	Pounds per square inch, a measure of pressure.
Reentrained Dust	Dust deposited on the roadway that is subsequently projected into the air by the passage of motor vehicles.
Regional Rideshare Program	The MAG sponsored program which provides free technical assistance to individuals, companies, and public sector entities interested in carpooling, vanpooling, or other transportation alternatives to drive-alone motor vehicle use.
Revised ROP FIP	1998 Ozone 15 Percent Rate of Progress Federal Implementation Plan as revised in 1999.
ROSS Plan	Regional Off-Street System Plan. A plan describing a region-wide system of off-street paths/trails for non-motorized transportation.
RPTA	Regional Public Transportation Authority. A political subdivision of the State of Arizona established in 1985 to conduct regional transit planning and to develop and operate a regional transit system in Maricopa County.
RTP	Regional Transportation Plan.
SIP	State Implementation Plan. Mandated by the Clean Air Act, SIPs contain details to monitor, control, maintain, and enforce compliance with National Ambient Air Quality Standards.
Socioeconomic Data	Data consists primarily of TAZ-level household projections of population and employment by type which are input to the MAG travel demand models.

TAZ	Traffic Analysis Zone. A small geographic area for which socioeconomic data is estimated in the MAG travel demand models.
TCM	Transportation Control Measure. A TCM as defined in CAA Section 108(f)(1)(A) includes any measure in an applicable implementation plan which is intended to reduce emissions from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions (e.g., transit improvements).
TIP	Transportation Improvement Program. An annual or biennial document listing transportation projects to be funded in upcoming years.
TMA	Transportation Management Association. A group comprised generally of businesses to identify and develop solutions to shared transportation problems.
TOG	Total Organic Gases. Gaseous emissions that lead to the formation of ozone.
Travel Reduction Program (TRP)	A program administered by Maricopa County, pursuant to the provisions of Arizona House Bill 2206 (1988), as subsequently strengthened by adoption of the Maricopa County Trip Reduction Ordinance.
USDOT	United States Department of Transportation.
V/C Ratio	Volume to Capacity Ratio. A parameter used to measure congestion. For a given roadway link, it is calculated as total traffic volume divided by capacity.
Violation	A term used to define the number of exceedances that result in noncompliance with the national standard.
VMT	Vehicle Miles of Travel. A measure of total vehicle travel within a specified area and time frame.
VOC	Volatile Organic Compounds. VOCs are emitted in the storage and use of fuel, solvents, and many industrial and consumer chemicals, as well as from vegetation. VOCs and nitrogen oxides, when emitted in the presence of sunlight, undergo chemical reactions which result in the formation of ozone.

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